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VAGARIES OF BUFFALO'S COUNCILMEN.

Buffalo, N. Y., has within the last five or six years occupied a good share of attention from those whose good or ill-fortune obliges them to remain residents of some one or another of the multitude of cities, towns or villages that go to make up the "balance" or residue of the United States not located in latitude 42°53′ north, and longitude 78°55′ west. The famous commercial heart that fringes the eastern extremity of Lake Erie, and a portion of whose seamy edge furnishes partial confinement for the agitated pulsation and ceaseless flow of the great Niagara river, that ever hurries on to keep alive a world's wonder, gave heart to the disciples of the Democracy, in bringing before their almost despairing gaze a Moses who would lead them in safety and triumph over the abyss which so long had opened wide its hateful mouth, and, thus yawning, prevented them from revelling in the savory messes that tradition told them constantly bubbled inside the casings of the fleshpots of office; and the promise was not in vain, for the abyss was bridged, the leader led and the followers followed, although the end is not yet, because there appears to be some trouble about the distribution of the pots, not to say anything about the absorption of their (the pots') contents. However, Buffalo having evolved from her midst a citizen to whom she proudly pointed at as one who, in turn, had been an honest Sheriff, a model Mayor, a watchful Governor, and likely to prove a perfect President, it is only fair to assume that if she could find the right sort of person to occupy high offices, the task of ferreting out others to properly carry on the duties of minor "public trusts" ought to be much more easily performed. Since men to be judged fairly ought to be judged by their acts, let us see how Buffalo's Councilmen answer to the requirements of the Buffalo gauge as applied to the consideration of the merits of office holders who are responsible to the public. Before proceeding to a close inspection of the faithfulness of the Buffalo Councilmen it might be remarked that the Lake Erie city, in order to properly comport with the dignity of her acknowledged prominence in the commerce of the United States, must needs acknowledge fealty to the progress of the hour. Electricity, or rather electric lighting, comes high, of course; but civic pride must be upheld at any cost—in fact, even if it be at the expense of the ratepayers—consequently Buffalo awarded a certain portion of her street lighting to the care and custody of the electrical promoters, and as time progressed the latter became bolder in their demands for more substantial recognition, in the shape of an increase in the dimension of their "care and custody" holdings. Generally the scheme for increase was cloaked under the guise of ratepayers' petitions presented to the Councilmen, who were to fix the seal of their sanction thereto. By means of this simple process Buffalo's electricians became possessed of a pretty fair lien on the amount annually appropriated for street lighting purposes, and their chief anxiety was how best to cause the lien to assume larger proportions. The principal streets, or those in the heart of the lighting district, were pretty well absorbed, and they could hardly expect to secure awards for illuminating the banks of the Niagara river; but having cast about in many directions, it was finally determined that some—or all, if possible—of the lanes, alleys, and bye-paths, which by devious or excursive winding managed finally to cross a bustling street or avenue, shou'd receive the full benefit of that "flood of light," which the researches of Gramme, in copper, and of Jablochkoff in carbon points, had made possible. The petition machine was set in motion, and this is what caused the latest evolution of motion in its frame. Roos alley is not much better than a cowpath of the ordinary suburban va-

riety, it being just 20 feet in width; and we have no intimation that its building lines mark the rise of palaces that enclose and support "marble halls," etc. But palaces or not, a Councilman asked that Roos alley, "on both sides," be lighted by arc lights. It would take three Brush lamps to "light up" satisfactorily "both sides of the alley," and these would cost for the year, at the contract price of 55 cents per light per night, $602.25 per annum. The next petition begged that Peabody street, between Elk and Seneca streets, be illuminated, for its length and breadth (no doubt that also means "both sides"), by four Brush lights, which would annually cost a total of $803. Now, it appears, from an examination of the Buffalo assessment department books that the Roos alley property returns, in the shape of lamp tax charges, an annual total of $5.90 to the city fund for public lighting maintenance, and the Peabody district—taking the total amount contributed in like manner for similar purpose for the entire length of Peabody street—reaches the magnificent sum of $41.65. Evidently the denizens of Roos alley and Peabody street would not object to the programme, for they were certainly to get their money's worth, even if the "value" were obtained rather directly from the purses of the patricians whose post office address directs the post man to a course of travel on Main street, or other equally prominent Buffalo thoroughfares. Such trifling disparities made no impression on the holders of a Councilmanic "public trust" in Buffalo, and they ordered that the prayer of the petitioners be granted. So far so good; Roos alley and Peabody street were near to the fruition of the mandate for a flood of light on both sides. The Mayor was yet to be heard from, and in due course the successor of a President returned the ordinance with a veto attached. His Honor was indignant over the matter, and explained, at some length and no little minuteness, but with undoubted logic, to the City Fathers why he considered them in the light of being actuated by motives solely attached to those who follow a course of "pernicious activity." As a sample of his Honor's opinion we quote the following paragraph of the veto:

"I do not hesitate to say that it is not only unreasonable and unjust, but that it is an outrage upon taxpayers of this city to compel them to pay for maintaining electric lights in obscure streets that are not in any sense thoroughfares or approaches to the city, and are used by few people except those directly benefited by such expense." But the Councilmen came to the rescue of "both sides" of Roos alley and Peabody streets in regular Spahi fashion. A motion to pass the ordinances over the Mayor's veto was put and carried, by a vote of 19 for to 6 against—thus the day was saved to the alley and the street.

In view of all this the conclusion must be irresistibly reached that while Buffalo may be trusted to evolve "model" sheriffs, mayors, governors, or even presidents, her inner consciousness has not yet reached that stage of development where she may hold forth to the startled, wondering gaze of suffering sister municipalities a Councilmanic type pure in all things, and above the alloy or tincture that inclines the present day Councillor to harken to the tinkle of temptation.

KEROSENE OIL AND DIPHTHERIA.

In our item columns of last issue reference was made to the theory advanced, or rather re-asserted, by Dr. Wilson, of Meriden, Conn., that the use of kerosene oil was in no slight manner accountable for the seemingly otherwise inexplicable spread of that mysterious malady called diphtheria. From Dr. Wilson's experience and standpoint, which latter he fortifies by the presentation of some confessedly startling figure results, it appears that the greatest percentages of fatal cases of diphtheria occur in households whose inmates employ kerosene oil to furnish them the necessary artificial illumination; and, further, his figures also show that all those who used either gas or candles, even when attacked by the malady, eventually reached a convalescent state. The Connecticut Doctor's affirmations have evoked widespread interest, and the agitation of the topic appears to gather strength with the lapse of time; which of course is not to be wondered at, for the matter strikes closely home to the major portion of the people of this country. We have received many letters anent this from gas men since Dr. Wilson's statement was published in the JOURNAL, and these without exception corroborate his views. In particular we might note an expression emanating from Mr. J. M. Starr, of Richmond, Ind, who says he knows of half a dozen instances in that city where diphtheria had appeared in households within ten days from the time the inmates commenced the partial use of kerosene oil either as an illuminant or as a feeder for cooking stoves. The proprietors of gas companies, particularly those doing business in the lesser localities, might do worse than to bring Dr. Wilson's statements prominently before the people's attention.

OUR current instalment of official report of proceedings of the American Association is more than ordinarily interesting. The discussion on Mr. Denniston's paper and Mr. Goodwin's figures are sure to receive close attention.

[OFFICIAL REPORT.—Continued from page 330.]

Fourteenth Annual Meeting of the American Gas Light Association.

HELD AT THE ACADEMY OF MUSIC, PHILA., PA., OCT. 20, 21, AND 22, 1886.

SECOND DAY—THURSDAY, OCT. 21—MORNING SESSION.

Discussion on Mr. Denniston's Paper, entitled "Some Further Remarks on Natural Gas."*

The President—We are all interested in this topic—particularly those who are within the gas well belt; and it is possible, if the volume of supply holds out, that natural gas will be extensively conducted to those sections of the country without the pale of the producing area. Mr. Young, of Pittsburgh, has had much experience in converting the natural product to an illuminating agent. We would like to hear from him.

Mr. R. Young—I shall be glad to answer questions that may be asked. In making an illuminating agent from natural gas the most important thing is to know what elements should be taken from or added to it. About 30 per cent. of hydrogen and 6 per cent. of hydrocarbons are necessary to success, and there is no difficulty in decomposing natural gas to that extent. The decomposition can be secured by passing natural gas through or over a bed of incandescent coal or coke, for by so doing you throw down the carbon and liberate the hydrogen to the extent required. With that accomplished, the addition of naphtha or any other enricher in sufficient quantity gives a lighting agent of the candle power required.

Mr. McMillin—Are you able to utilize the carbon which you throw down in getting your hydrogen?

Mr. R. Young—If you use steam generators I have no doubt that the oxygen of the steam combines with the carbon of the gas, forming CO. You reduce the consumption of the coal or coke materially by the introduction of steam; consequently you combine the carbon of the gas with the oxygen of the steam, and form carbonic oxide.

Mr. Littlehales—What is the estimated quantity of natural gas consumed per day in Pittsburgh?

Mr. R. Young—My brother, who is Superintendent of the Allegheny Natural Gas Company, can answer that better. I think about 400 million cubic feet.

Mr. Littlehales—At what pressure?

Mr. R. Young—At the normal 5 inch water pressure. That is the pressure which is considered most economical at the point of combustion.

The President—Mr. McElroy, can you tell us something more about natural gas?

Mr. McElroy—I do not believe I can add anything to what has been already said on the subject. Mr. Young has given the component parts of the gas, and has told how to employ it in order to make the best use of it. I am engaged in a practice similar to his. Mr. Denniston follows another plan, but his system tends to the same point. In the matter of statistics, Mr. John Young, who is engaged with the Allegheny Heating Company, which supplies natural gas for fuel purposes only, can speak more exactly than I could be expected to.

The President—Is Mr. John Young present?

Mr. J. Young—Being a "natural" man, I do not know that any information I could give would be of much use to you "artificial" folks. (Laughter.) About 3,000 houses in Allegheny are now using natural gas for fuel purposes. The same grates and stoves that were used for coal are now employed in consuming natural gas. The Allegheny Heating Company at first introduced meters for measuring the gas, and then it was to the interest of consumers to use it as economically as possible; but in the last year three other companies have been admitted to the city, whose managers supply by contract; and so you see there is no inducement on the part of consumers to exercise any economy. If a party selling stoves says to a consumer, "Here is a stove that will save you 50 per cent. of the gas you are now consuming, and I will sell it to you for $1," the consumer would reply, "I get all the heat I want with my present appliances, and so there is no need for me to throw away the dollar." In consequence of the contract system an enormous amount of waste goes on. People supplied by contract light every fire in their houses, and burn the gas night and day, with the result that they not only "dry" themselves out, but so dry out their furniture that it often comes apart; and then they complain that natural gas makes a "dry heat." But it is not surprising that a "dry heat" is secured. If you keep up continuously, day after day, a steady temperature of from 70° to 80° in a room, of course every particle of moisture will be absorbed from the walls, furniture, etc., and that is one of the important complaints made by users of natural gas. Nevertheless, if common sense and moderation ruled its employment the "dry heat" objection would disappear—at least that is my impression.

*Ante, p. 330.

Mr. McElroy—I think Mr. R. Young made a very low estimate with regard to the quantity of gas consumed in Pittsburgh. I believe 700 millions per diem would be closer to the mark than 400.

Mr. J. Young—A very large increase was made during the last three months. The estimate given by my brother was made on the work of some time ago. I think the quantity named by Mr. McElroy may be pretty near the mark.

Mr. Denniston—Natural gas is now used by all the principal manufacturers in the cities of Pittsburgh and Allegheny; and it is used for about every purpose for which coal was formerly employed.

The President—What prices are charged?

Mr. J. Young—Being sold by contract, it is very difficult to arrive at the prices. I suppose the average price received for gas for manufacturing purposes would not exceed two or three cents per thousand feet.

Mr. Littlehales—What is the probable area within which gas wells may be found?

Mr. J. Young—Within a radius of 20 miles of Pittsburgh the greatest supply is now found. There are straggling wells all through Ohio, and in other places.

Mr. Littlehales—Does it extend north of Pittsburgh at all?

Mr. Young—Yes.

The President—It would be interesting to those living outside of this belt of natural gas to hear the opinions of those who are conversant with the matter, as to the cost of conveying the gas to a distance, and there distributing it. They propose to convey the gas from the gas well district to the city of Buffalo, N. Y.—a distance of perhaps 200 miles. The cost of distributing that gas in Buffalo (I am speaking with reference to its use for fuel purposes only), it seems to me, would be about equal to that of distributing coal gas—the ratio of consumption being equal; but undoubtedly there would be a much larger proportionate domestic consumption if you could supply consumers at a price which they could afford to pay than there would be in the case of coal gas for domestic purposes. It would be interesting to know at what cost it could be conveyed, for instance, to Buffalo, and there distributed and sold. In Pittsburgh the cost has been mentioned to be only a few cents per thousand feet; but it could hardly be distributed for domestic fuel purposes at any such approximate price.

Mr. Young—I think the cost of conveying the gas over such a distance would be so great that I question whether it could be possible to deliver it as cheaply as coal gas made on the spot, unless the appliances for using the natural gas were very much more economical than those used at Pittsburgh.

Mr. Littlehales—Is there a sufficient consumption to take up all the natural gas already found in Pittsburgh; or does a good deal of it go to waste?

Mr. J. Young—A very great quantity goes to waste. It is necessary that there should be not only enough gas for ordinary consumption demands, but there must also be sufficient to supply the largest consumption—which inordinate demand may exist but for a few days or weeks. Until lately no attempt was made to "plug down" the wells and keep the gas in the ground. You have either to "plug" the volume down in the wells or else let the surplus over the carrying capacity of the conduits pass into the atmosphere. I think that until lately the waste exceeded the consumption.

Mr. Monks—A statement recently appeared in the Eastern papers to the effect that there was a decided diminution in the output of natural gas, and that some establishments in Pittsburgh had been compelled to close in consequence. Is there any truth in it?

Mr. J. Young—No. The reason for shutting down the places was this: A company formed in 1885 laid pipes to the Washington county wells, and some of the consumers have run short of gas because that company had taken on more customers than it could supply. The failure was not caused by any weakness at the wells, but solely by the deficient carrying power of the company's plant. Our company at Allegheny may obtain about 8 cents per thousand from domestic users, and those who obtain their gas under the contract rule do not pay more than 5 cents; but those who employ natural gas in their factories do not pay in excess of 3 cents per thousand.

Mr. Denniston—So many of these items were mentioned in my paper of last year that I did not think it necessary to speak of them to-day, because I thought their presentation would be somewhat in the nature of a re-hash; but as there are some present now who were not in attendance last year I suppose they will be interested in learning all the facts.

The President—I know that Mr. Denniston gave us statistics last year, and if the members will only refer to their files of the American Gas Light Journal they will find the information of which they are in quest, especially in connection with Mr. Denniston's paper. One point of interest in this discussion is to determine at what cost natural gas can be delivered in cities more or less remote from the gas well district. As I understand the Pittsburgh and Allegheny situation, the enormous quantity distributed (700 million cubic feet) is largely taken up by the fires of various manufacturing establishments, such as rolling mills, foundries, glass works, etc., where sometimes in a single instance a tremendous quantity of gas, or that sufficient to take the place of many hundred tons of coal, is used. That being so, the point I wish to determine is, for instance, whether the gas can be piped to Buffalo and distributed through the streets of that city for domestic purposes (without there also having an excessive consumption at a few points) at prices approximating those charged at Pittsburgh and Allegheny. Further, I would like to know if (in the case of Pittsburgh and Allegheny companies supplying natural gas) they supply indiscriminately to the manufacturing interests and to domestic consumers at the low rates mentioned.

Mr. J. Young—The same companies supply both classes.

The President—How many miles of pipe are required in Pittsburgh for that distribution?

Mr. J. Young—I think about 150 miles.

The President—Does that estimate include the piping from the wells to the city? I meant to refer only to the piping necessary for distribution within the city limits.

Mr. J. Young—I cannot tell you exactly. Allegheny has 33 miles of distribution pipe.

The President—You see that is a very limited amount of piping for the distribution of such an enormous quantity of gas, and hence it can be sold at these low prices. The question now is whether it could be brought into Buffalo, and furnished at a price which would enable it there to compete with coal for fuel.

Mr. J. Young—Our experience shows that if natural gas costs very much more than coal the former will not be used to any great extent. A few people might take it as a luxury; but should it cost very much more than coal the consumption will be comparatively limited.

Mr. Denniston—I think the statement of mileage made was too low. Mr. Young is keeping within the minimum all the way through—as I try to do; but I believe in this case he errs on the mileage computation, for there are probably three or four separate lines of pipe—each probably footing up to 30 or 40 miles—that come from the Murraysville district alone.

Mr. J. Young—In my reply to the President I referred only to the city of Allegheny. There are about 33 miles of piping laid in Allegheny for distribution purposes alone. I do not know what the mileage is outside of the city.

Mr. Denniston—The President speaks of the quantity of gas that can be delivered at the low prices stated. Now, both Pittsburgh and Allegheny are largely made up of manufacturing establishments, and one of those industrial hives will take up a greater quantity of gas than would be absorbed by all the private consumers located on a five-mile stretch of pipe; yes, perhaps more than would be taken up on a ten-mile stretch. The Highland avenue reservoir and pumping station of the Pittsburgh water works in 1884 absorbed—even at the low figure charged in Pittsburgh—$45,000 worth of coal. In 1885 gas was laid on, and the contract price for that year for gas was $45,000; but this year a contract for the necessary gas fuel was made in consideration of an annual payment of $20,000. This instance alone affords an example of the volume of capital which the supply to one establishment will pay interest on. In fact that simple amount pays for the capital expended in bringing the gas to the city, and the suppliers can afford to sell it there at low prices. I speak now more particularly of Pittsburgh for I am more concerned with that city than Allegheny. The low price to ordinary consumers permits of fair profit because the owners of the manufacturing enterprises require such enormous quantities. I believe that no meters are used in Pittsburgh, no matter whether the gas is supplied to manufacturers or to ordinary consumers for domestic purposes. There is so great a surplus over the demand that the supply pipes are dotted with outlets to permit of the escape of the gas when the carrying capacity of the mains is overtaxed. As Mr. J. Young remarked, they cannot get along without the vents, for to-day the mills are in operation, but to-night they may be stopped; and so it is necessary that the surplus gas shall pass out at the vents in order that the pressure shall remain at a proper rate. The aggregate quantity of gas used in the mills is so great that, although you get eight or ten cents per thousand cubic feet from individual consumers, the consumption of the latter figures to but a small percentage in the total output. I think Mr. Young is quite correct in his statement that two or three cents per thousand cubic feet would represent the price received. I said last year I did not believe the price would amount to three cents per thousand, if the suppliers were paid by the thousand for all that was delivered. In addition I said probably half as much as the quantity used was wasted, or not utilized in any possible way. Still you must of necessity have that surplus and waste. You cannot supply only the precise volume needed, for you cannot store it in a holder and keep it until you want it, therefore this waste goes on constantly, simply because it is necessary that an abundant supply may be delivered, at all hours and times, to meet the ever varying demands of the mills. They are continually putting down new wells—even though the wells now yielding gas show no signs of falling off—for the demand is increasing, and, therefore, they must

increase their initial supply in order to keep the required quantity ever ready to meet the erratic and increasing demands of the mill owners.

Mr. Helme—At what pressure is the gas delivered from the street mains to the appliances of the consumer?

Mr. J. Young—In Allegheny it is supplied at a five-inch water pressure.

Mr. Thompson—What effect had the use of natural gas upon the output of the artificial product? Has it had any effect on the sales of artificial gas?

Mr. Denniston—I cannot say it has. I am informed that the increase in sendout in Mr. McElroy's district has been considerable. In my district we have increased steadily notwithstanding the cheap and abundant supply of natural gas, and notwithstanding the efforts made to make an illuminant of the natural gas. You may improve the illuminating power of natural gas by simply passing it over a tub of oil placed in your yard; but the after effect of its use as an illuminant is such that you can scrape the carbon from the walls of the room. There are quite a number of appliances in use for carburetting the gas, but the combustion is always defective.

Mr. Thompson—The sales of artificial gas have not decreased?

Mr. Denniston—No. We increased to such an extent that we have pursued the policy (advocated by members here) of reducing the selling rates. Two years ago I sold gas at $2.50; then I reduced to $2, with 20 per cent. off; and now I have reduced to $1.50, with ten per cent off. The increase in output goes right along. Our output increases notwithstanding the competition of incandescent lights, cheap natural gas, and cheap carburetters. I do not question that this natural gas may be used eventually—in fact it is now being used in a number of smaller towns, after being treated in the manner I have mentioned—and is distributed by the coal gas companies. Some coal gas companies are using the natural gas and distributing it through their mains. The question was asked me why the coal gas men could distribute gas more cheaply—I stated it could be done—than the natural gas men in the same municipality. It is because the former have their services in the ground and connections already made with the houses; and then they can run at a low pressure. The latter would have to put in new sets of fixtures, and would have to run at a pressure sufficient to furnish fuel all over the house, which is a very much higher pressure than coal gas men use for sending out their illuminating gas. I think the advantage is with the coal gas men, even in the matter of distribution, where the natural gas is abundant, when used for both fuel and light, or for light alone.

Mr. Littlehales—One thing I think we may conclude, from the remarks made here, is that we have no cause for depression of mind as to the future of the gas business. Surely, if there is any one condition of affairs worse than another for coal gas men it would be the present condition of things in Pittsburgh. Some of the members have been a good deal depressed at the probable effect of the electric light on the gas industry. Well, they have had electricity to contend with in Pittsburgh; and they also had what would seem to be a little worse for them—natural gas, gushing out at the rate of over 700 millions cu. ft. per day; but notwithstanding these facts we find the gas men from Pittsburgh are as hopeful about their artificial gas business as ever. I think, after having learned from them their experience, we can all go home in a very contented state of mind.

Mr. McElroy—Our company's fiscal year ends July 1st. Last July's statement proved our increase to have been 25 millions cubic feet on an output of 360 million cubic feet the previous year; and such was the case notwithstanding the fact that during five months of the year 1885–6 the early closing movement was in practice. You all know the Knights of Labor have controlled things a good deal in the last year, and one of their Pittsburgh edicts was to the effect that the retail shops—the clothing and grocery stores—should close at 6 o'clock P.M. That cut off a great deal of the usual consumption of gas. We also had two incandescent light companies born in our city during the year. Notwithstanding it all our output for the year showed an increase of 25 millions cubic feet over the record for 1884–5.

The Secretary—I think Mr. McMillin can give us some figures on this subject.

Mr. McMillin—I probably feel a great deal more interest in the natural gas question than most of the members. I have devoted a good many of my spare hours during the year to its study, and have not possessed the advantages of location enjoyed by Messrs. Young, McElroy, and Denniston. Owing to lack of propinquity I had to do a great deal of figuring; whereas, had I been in their locality I could have had my information from observation without resorting to figures. I am glad to know friend Denniston has succeeded in making illuminating gas from natural gas. I did not intend any disrespect to those who thought it could not be done, when I said a year ago that because some had failed it did not follow that others would not succeed; verily, those who failed then are the ones who have succeeded now. I believe to-day all the "artificial" gas men at Pittsburgh are using more or less of the natural gas; and I have great faith that they will in the future be able to use very much more of it than they are using now. From what little I know of the process Mr. Denniston is introducing I think he will be able to make almost his entire product from natural gas. To my mind there is no question but that all the Pittsburgh gas men might use 33 per cent. of it very well, and I think finally they will decide that 75 or even 90 per cent. of natural gas may be employed in the manufacture of the gas they send out for illuminating purposes. I believe that to be possible. I hope, before this discussion ends, that Mr. Denniston will give us an analysis of the gas made by his apparatus and sent out to his consumers, so that we may judge something of its value. The gas is said to be very satisfactory to consumers, but the most of us would possibly have a better idea of this if we saw the figures of the components. I think the question of the President is one of very considerable interest—*i. e.*, whether the natural gas field can supply districts from 75 to 100 miles away and make a commercial success out of the business. I think that fact has not yet been fully determined. I had occasion to visit a city (it is being piped for natural gas) a few weeks ago, and a very competent engineer was in charge of the business—a man of superior intelligence indeed. They were piping their gas 60 miles, and proposed to use a 10-inch conduit. He said he did not know whether he was going to get 100,000 or 100 millions feet per day. He had visited Pittsburgh and talked with some parties who evidently did not know, and with others who probably did know, but who concealed the facts from him, so that he was totally at a loss about what could be done. I think a great deal of the work in that direction has been done in a similar manner, and it remains to be seen whether such work will be successful. I would say, in order to cause natural gas to supplant coal gas in Buffalo you would need to have a supply equal to 75 millions cu. ft. per day. Assuming the President is right as to the distance (though I think he is mistaken) and that Buffalo is 200 miles from the gas fields, I would say a pipe large enough to take that quantity of gas the distance named, assuming you started with 250 pounds pressure, so that the terminal pressure would be sufficient, would cost over ten million dollars. They would have to sell many hundred millions of feet of gas in order to pay the interest on the cost of that pipe. I have not figured on the Buffalo case, but have done so with regard to other places, and I know it would cost some ten million of dollars to provide for carrying 75 million cu. ft. of gas per day, at a pressure of 250 pounds per square inch, a distance of 200 miles. In matter of heating, there can be no doubt natural gas is very much superior in that respect to any other fuel that has ever been used. Neither raw coal, water gas nor coal gas can compete with it. We have heard during the last five years a great deal about fuel gas—*i. e.*, fuel water gas, which it was claimed was very superior because of the large percentage in it of the two gases that give the greatest heat—carbonic oxide and hydrogen. They are supposed to be the all-important gases for heating purposes; but when you figure the matter over carefully the results of the examination are likely to astonish you. I have a great array of figures here which give the details. They are theoretical calculations, and I will not read them. I have one calculation, however, which will give results to you in a rather practical way. We will assume that ordinarily the gases which escape from your furnaces, steam boilers, or other apparatus of that kind, are at a temperature of about 500°. With coal and coke we assume it takes about 100 per cent. excess of air in order to secure perfect combustion. With natural or any other gaseous fuel we can safely put it down at 20 per cent. excess. We cannot work it down close enough to get along with simply the quantity required, but will have to allow a little excess of air. I will take the analysis figures of a gas that I have tested which does not differ materially from most of the gases found at Pittsburgh. Some chemists are said to succeed in getting different results from day to day, or even from hour to hour; but I think a little of that difference may be in the man rather than in the gas—for I would not expect that 50 per cent. of hydrogen would be present one hour, and but 20 per cent. the next hour. Assuming that we mix 20 per cent. excess of air with each of the gases named, and that the gases escape from the stack at a temperature of 500°, then 1,000 feet of natural gas will heat from 60° up to 212°, and evaporate 893 pounds of water; whereas coal gas, under like conditions, will evaporate only 591 pounds. There is a big difference. Water gas, pure and simple, will evaporate 262 pounds of water, and the Siemens producer gas will evaporate 115 pounds. Now, as far as heating purposes is concerned, we see that natural gas has very greatly the advantage. I want to refer to the idea that a fuel gas can be made and distributed for fuel purposes alone very much cheaper than water gas can be made and distributed for illuminating purposes. That is a grievous mistake, I think. The water gas men can sell gas for illuminating purposes, which can be used by the consumer also for heating purposes, with greater economy than they can use the pure and simple water gas alone without an enricher. We want a gas which can be used for any purpose; and when it is a good illuminating gas it will be found cheaper for heating purposes than it will be if it is only a pure and simple water gas. You will notice I put the producer gas very low—at 115 pounds of water to a thousand feet of gas. Let us assume that the Siemens gas is made from gas coal. We hear it stated every day that when the natural gas supply fails gas will be made at the coal mines, from the waste material, and distributed long distances, and that the world (mean-

ing Pittsburgh) will never return to solid fuel again. Slack coal, of course, carries a larger percentage of ash and dirt than the "run of the mine" would have, and I assume that this slack coal possesses not more than 55 per cent. of carbon, 15 per cent. of volatile combustible matter, 10 per cent. of water, and a like quantity of tar. Deducting the ash and the water, we would have, fixed carbon, 61; volatile and combustible matter, 16.67; water, 11; tar, 11. Taking that as the composition of the material out of which the gas is made we would get a yield of—carbonic oxide, 22.69; water vapor, 2.16; carbonic acid, 7.93; nitrogen, 61.82; illuminating gas, 3.24; tar, soot, etc., 2.16. The calorific value of water gas is 7,069 units; of coal gas, 22,968 units; and of natural gas, 24,195 units. These are the theoretical values of the several gases, but their practical value will be modified by the quantity of air required to consume them. The heat carried off by the escaping gases would reduce these values for purposes of practical use. So, whenever we see a calculation made as to the calorific value of various gases we really get only an imperfect idea of their real value. There may be very little difference shown in the calorific value of two gases, and yet there may be a vast difference in them when you consider their evaporating power. Analyses of the Pittsburgh gas seem to vary a great deal with some chemists. The analyses of my friend, Mr. Young, suit me better than the others, because they are pretty uniform, and are not troublesome to work from—and, by the way, I have great faith in whatever he does. The Findlay gas has this composition: Hydrogen, 2.18; marsh gas, 92.60; carbonic oxide, 0.50; ethylene, 0.31; watery vapor, none; carbonic acid, 0.26; nitrogen, 3.61; oxygen, 0.34. In making these comparisons I take a coal gas which gives the following analysis: Hydrogen, 46; marsh gas, 40; carbonic oxide, 6; olefiant gas, 4; watery vapor, 1.15; carbonic acid, 0.5; nitrogen, 1.5; oxygen, 0.5. I state these so that if anyone wishes to verify the figures he will know the basis on which I calculated. I have here a vast array of figures which show the quantity of oxygen required for the combustion of a thousand feet of natural and the other gases, and also what the resultant gases are; but the statements are entirely too lengthy to be read here. The paper from which I quote was not prepared for this Association. Its statistics are so voluminous that I would not undertake to remember them, and feeling that I might have occasion to refer to them I brought the paper along for reference. The matter contained in it is very interesting to me, although it may not be so to others.

The President—Mr. Hequembourg, of Bradford, Pa., has much experience in furnishing natural gas for light and fuel; and in fact he was about the first to go into that business. He having entered the meeting hall subsequent to the reading of Mr. Denniston's paper, I would inform him that that paper concerned the carburetting of natural gas in order that it might be used as an illuminant. Now, I understand the Bradford natural gas is richer in quality than the Pittsburgh product, and that the former does not require carburetting; therefore I wish Mr. Hequembourg would relate to us something of his experience in the premises.

Mr. Hequembourg—Having listened to the remarks of Mr. Young and others, I do not know that anything I could say in regard to natural gas would be of interest. Mr. McMillin substantially restated what I stated* to the Association at the Washington meeting of 1884, when I claimed the calorific power of natural gas to be about 33 per cent. in excess of that developed by coal gas. The experiments made at the Bradford works showed us that one foot of natural gas would evaporate a pound of water—that is, when burned in large quantities for the evaporation of large amounts of water; say, for instance, the quantity required at our pumping station, which at that time we used for pumping gas through the mains for a long distance. The Bradford gas is obtained under great pressure, and differs somewhat from the gas found near Pittsburgh. None of our gas is allowed to escape, either through vents or by ordinary leakage, if we can avoid it. I have seen at Pittsburgh, as stated by Messrs. Young and McElroy some moments ago, that large quantities—possibly 25 or even 50 per cent.—are there allowed to go to waste; but in our section of the country no such waste occurs. All our gas is confined to the rock until the time for its use is at hand. We distribute our gas in a different way from the Pittsburgh method, and I think their mode of distributing it may account for the explosions, resulting in great loss of life and property, which have taken place in the Smoky City. I think these explosions may undoubtedly be attributed to the excess of pressure carried in their mains for the sake of economy in distribution. I think that if the natural gas business were conducted with the same degree of economy that obtains in the artificial gas supply these disasters would not occur. There is no doubt that natural gas will, in large measure, be used as an illuminating gas in districts within reach of it, and I am confident it will be transported, with very small expense, for a distance of a thousand miles without any trouble or difficulty whatever. It can be used to even as large an extent as Mr. McMillin puts it—75 to 95 per cent.—as the basis of an illuminating gas of superior quality; and that it can be so used in cities as far distant from the gas fields, for instance, as Philadelphia is.

*See JOURNAL, Nov. 17, 1884, p. 257.

Mr. Nettleton—The part taken by Mr. McMillin in this discussion was so interesting, and he quoted at such length from the paper in his possession, that I would like to know more of his experience. I therefore move that Mr. McMillin be requested either to furnish his paper in full for publication with our proceedings, or to furnish a synopsis of the same, as he may see fit. (Seconded by Mr. Littlehales.)

Mr. McMillin—I am very much obliged to you, gentlemen, for the compliment; but I have to state, in self-defence, that the State of Ohio is to pay me for writing the paper, and I would have to ask permission from the Governor before it could be published elsewhere.

The President—I think, however, that Mr. McMillin could give us a synopsis of the paper without interfering with his duty to the State of Ohio. (Mr. Nettleton's motion was agreed to.)

On motion of Mr. Littlehales, a vote of thanks was tendered to Mr. Denniston.

Committee of Arrangements.

Mr. Harbison—At yesterday's session the President was authorized to appoint a Committee of Arrangements for the next annual meeting, and the number named by the motion was five. It is well known the Committee will have more than the usual quantity of work to do, and therefore, with the permission of the Association, I would like to move that that Committee consist of nine members and the Secretary instead of five, so that the work may be thoroughly attended to, and that we may secure such an exhibit pertaining to the gas industry as we all desire to have.

The President—The members of the Association will remember that I was directed to appoint two committees—one to take charge of the ordinary arrangements for the meeting, and the other to have charge of the gas exhibits. It is quite necessary that those two committees should work together as one body. I understand the object of Mr. Harbison's motion to be to require the appointment of one committee of nine members and the Secretary (ten in all) who shall act in both capacities, and that we reconsider the motions made yesterday relative to the separate committees. (No objection was made, and Mr. Harbison's motion was agreed to.)

Appointment of the Joint Committee.

The President—I will appoint on that committee Gen. Chas. Roome, and Messrs. T. F. Rowland, J. R. Floyd, E. D. White, G. F. Kreischer, W. H. Down, G. B. Edwards, W. Henry White, C. W. Isbell, and C. J. R. Humphreys.

Notice of Proposed Amendment to the Constitution.

Mr. Stiness—In view of the extent to which the present Committee on Nominations for members have reported on and presented aspirants for election, I feel compelled to utter a protest, as an individual member, at the extent to which the Association is proceeding, and has ever proceeded in the matter of promiscuous admission to its membership. I announce now that before the closing of this meeting I shall offer an amendment to the constitution having for its purpose the limitation of our membership. I claim it is time that we cried a halt. This is an Association of gas engineers, and it is not an Association of those who go about the country as the paid agents of those who supply things which are needed in the gas industry. I admit that the constitution contemplates receiving such into membership—and I say not one personal word against those gentlemen—for I greet them to-day as our peers in this Association; but glancing at the array of names presented here for membership, I feel it to be my duty to raise my voice in this convention, and with no uncertain sound, with respect to the manner in which this Convention is adding to its list of names. (Applause.) I respect every man who is associated with us in this industry, and I do not stand here in this position as against any set of men. The list presented contained the names of four of my associates and intimate personal friends, and in taking this position I assure you I have no personal feeling to gratify. I want to retain in its ranks every man who is to-day a member of this Association; but I tell you, gentlemen, it is time we sounded the bugle call of "halt," and therefore I give notice that before this meeting terminates I shall introduce a resolution to amend the constitution. I hope that all the members will be present to hear it, in order that they may understand it, and know what action to take thereon at the next annual meeting. (Applause.)

Mr. Helme—We are pretty near the close of our session. Mr. Stiness has expressed his views on this subject, and I do not propose to say much about it. I think the proper mode is the one that he has suggested. If he is not satisfied with the present arrangement it is his privilege, as it is the privilege of every member of the Association, to offer an amendment to the constitution which shall effect a change. Such an amendment must be presented at one session, and be discussed and acted upon at the next. Therefore we need not discuss the matter on this occasion.

The President then introduced Mr. W. W. Goodwin, of Philadelphia, Pa., who read the following paper, entitled—

STATISTICS REGARDING THE GAS COMPANIES OF AMERICA.

Mr. President:—At our 1884 meeting a suggestion was made that the Association, through its Secretary, solicit from the various gas companies of the United States such statistics as would permit the compilation of certain information in the matter of capital invested, processes used, output, public lamps, and price per thousand cu. ft. of gas consumed. After some discussion the project was abandoned upon a statement being made by me that the company of which I am President proposed, at an early day, to issue a new directory; and that an effort would be made to secure as much as possible of the information desired.

About the first of this year we commenced the work of compilation preparatory to issuing the new volume. That was completed and issued on March 1st, 1886; but notwithstanding the care taken to have the directory perfect and reliable, errors in names and omissions were discovered in the volume, whereupon the task of securing authentic information for the issue of a supplemental edition was renewed, and the revised copy was in readiness for distribution on the first day of the present month. The preparation of the facts herewith presented absorbed the entire (working 8 hours per diem) time of one person, on every working day of ten months, and a total of 4,875 letters and postal cards were mailed and received upon the subject. With the corrections contained in the supplement it is believed that the information published is as reliable as can be obtained, and on the data secured in that compilation the statistics about to be presented are based.

With these prefatory remarks I will now present the data secured, which I have thought best to present in the following order: Number of gas works; process used; output per year; public lamps supplied; population supplied; price charged per thousand feet; amount received for public lamps.

The number of gas companies in the United States, as near as can be determined, is 971; in the Dominion of Canada 47, or a total for both of 1,018.

Of these companies 888 in the United States responded, in a greater or less degree, to our request for information, and 83 failed to reply. Of the companies in the Dominion of Canada 40 replied, 7 failing to respond.

Of the 888 companies in the United States that replied to our inquiries, 592 manufacture gas from coal, and 296 manufacture under one or another of the various patents and processes known as simple water gas, or water and oil, water, coal, and wood, etc., systems.

In the Dominion of Canada out of the 40 replying, 24 companies make gas from coal, and 16 from all other processes.

The 971 companies in the United States employ 2,801 persons, who fill the respective offices of President, Secretary, Treasurer, Superintendent, and Engineer. In some of the companies several of these positions are filled by one person.

Of the companies in the United States that replied, 140 gave process and price, but nothing in regard to output; 38 gave process, but nothing as to prices and output; 7 mentioned output and process, but no prices; 5 gave prices, but neither output nor process; 1 gave output, but no price or process; and 72 were silent on all the foregoing particulars. In Canada, of those that replied, 2 gave price and output, but nothing as to process; 1 mentioned price and process, and was silent as to output; 1 returned process, and said nothing about price or output; while 4 were silent on these items.

THE FOLLOWING IS A RECAPITULATION OF THE ANNUAL OUTPUT, SELLING PRICE PER THOUSAND CUBIC FEET, NUMBER OF COMPANIES SELLING AT EACH RATE, AND TOTAL AMOUNT RECEIVED AT EACH PRICE.—*United States.*

Coal Process.				Other Processes.			
No. Cos.	Gas, Cubic Feet.	Price.	Amount Received.	No. Cos.	Gas, Cubic Feet.	Price.	Amount Received.
1	11,000,000	$0 75	$8,250				
1	80,000,000	90	72,000				
4	2,100,000,000	1 00	2,100,000	3	565,000,000	$1 00	$565,000
1	175,000,000	1 10	192,500				
3	256,500,000	1 25	320,625	1	50,000,000	1 25	62,500
8	943,600,000	1 40	1,321,040	1	15,000,000	1 40	21,000
26	1,879,900,000	1 50	2,819,850	6	987,500,000	1 50	1,481,250
1	730,000,000	1 52	1,109,600				
7	3,055,000,000	1 60	4,888,000	2	69,000,000	1 60	110,400
				1	2,000,000	1 62	3,240
2	58,000,000	1 65	195,700				
				1	850,000	1 66	1,411
2	390,000,000	1 70	663,000	1	135,000,000	1 70	229,500
16	2,088,000,000	1 75	3,654,000	8	1,238,000,000	1 75	2,166,500
1	27,000,000	1 77	47,790				
14	444,200,000	1 80	799,560	1	292,000,000	1 80	525,600
1	11,000,000	1 90	20,900	2	25,000,000	1 90	47,500
104	2,519,400,000	2 00	5,038,800	44	1,346,750,000	2 00	2,693,500
2	94,000,000	2 10	197,400	1	40,000,000	2 10	84,000
				1	4,000,000	2 12	8,480
1	14,000,000	2 15	30,100				
4	29,250,000	2 20	64,350				
45	468,680,000	2 25	1,053,180	12	215,090,000	2 25	483,952 50
1	4,400,000	2 30	10,120				
1	6,000,000	2 35	14,100	1	2,500,000	2 35	5,875
3	28,000,000	2 40	67,200				
1	15,000,000	2 43	36,450				
				1	40,000,000	2 44	97,600
102	1,230,075,000	2 50	3,075,187 50	43	304,701,800	2 50	761,754 50
2	13,500,000	2 60	35,100				
3	13,000,000	2 70	35,100	2	20,000,000	2 70	54,000
18	102,250,000	2 75	281,187 50	2	9,000,000	2 75	24,750
1	2,500,000	2 80	7,000				
2	11,000,000	2 85	31,350	1	8,000,000	2 85	22,800
71	474,100,000	3 00	1,422,300	15	72,100,000	3 00	216,300
1	1,800,000	3 15	5,670				
2	11,500,000	3 20	36,800				
				1	5,000,000	3 25	16,250
19	126,100,000	3 50	441,350	6	25,050,000	3 50	87,675
1	2,000,000	3 60	7,200	2	11,000 000	3 60	39,600
1	17,000,000	3 75	63,750				
10	42,150,000	4 00	168,600	9	13,550,000	4 00	54,200
				1	1,500,000	4 25	6,375
3	5,800,000	4 50	3,600	3	7,000,000	4 50	31,500
8	19,200,000	5 00	96,000	5	18,510,000	5 00	92,550
1	3,000,000	6 00	18,000	3	3,200,000	6 00	19,200
495	17,502,305,000	....	$30,452,710 00	180	5,526,301,800	....	$10,014,263 00
				3	7,100,000	7 00	49,700
				2	11,000,000	8 00	88,000
				2	6,000,000	10 00	60,000
				1	4,000,000	20 00	80,000
				188	5,554,401,800	....	$10,291,963 00

	Annual Output.		Amount Received.	
Coal process	17,502,305,000 cu. ft.	..	$30,452,710.00	= $1.73 $^{93}/_{100}$, av. price per M.
Other processes	5,554,401,800 cu. ft.	..	10,291,963.00	= 1.85 $^{29}/_{100}$, av. price per M.
All processes combined	23,056,706,800 cu. ft.	..	$40,744,673.00	= $1.76 $^{71}/_{100}$, av. price per M.
Processes other than coal at $6 or less per M.	5,526,301,800 cu. ft.	..	$10,014,263.00	= $1.81 $^{2}/_{10}$, av. price per M.

If "other processes" in excess of $6 per M. be deducted, the grand av. price will be $1.75 $^{75}/_{100}$ per M.

RECAPITULATION OF ANNUAL OUTPUT, SELLING PRICE, ETC.—*Canada.*

Coal Process.					Other Processes.				
Output, Cu. Ft.		Price.		Amt. Received.	Output, Cu. Ft.		Price.		Amt. Received.
445,500,000	....	$1 50	....	$668,250	300,000,000	....	$1 25	....	$375,000
					30,000,000	....	1 50	....	45,000
95,000,000	....	2 00	....	190,000	9,000,000	....	2 00	....	18,000
22,500,000	....	2 25	....	50,625	7,500,000	....	2 25	....	16,875
12,500,000	....	2 50	....	31,250	30,000,000	....	2 50	....	75,000
4,000,000	....	2 70	....	10,800					
2,000,000	....	2 80	....	5,600					
39,300,000	....	3 00	....	117,900	7,450,000	....	3 00	....	22,350
700,000	....	3 20	....	2,240					
8,000,000	....	3 25	....	26,000	5,000,000	....	3 25	....	16,250
					8,000,000	....	4 00	....	32,000
629,500,000	....	—	....	$1,102,665	396,950,000	....	—	....	$600,475

Average price per M., $1.75. **Average price per M., $1.51.**

Price Charged per Thousand Cubic Feet.

United States.

No. Cos.	Rate.	No. Cos.	Rate.	No. Cos.	Rate.
1	$0 75	1	$1 93	109	$3 00
1	90	190	2 00	1	3 15
10	1 00	4	2 10	2	3 20
1	1 10	1	2 12	2	3 25
5	1 25	1	2 15	33	3 50
7	1 40	4	2 20	3	3 60
1	1 43	63	2 25	1	3 75
38	1 50	2	2 30	22	4 00
1	1 52	2	2 35	1	4 25
10	1 60	3	2 40	7	4 50
1	1 62	1	2 43	15	5 00
2	1 65	1	2 44	9	6 00
1	1 66	173	2 50	1	6 50
4	1 70	2	2 60	3	7 00
25	1 75	6	2 70	3	8 00
1	1 77	21	2 75	5	10 00
23	1 80	4	2 80	1	20 00
3	1 90	3	2 85		

Price Charged per Thousand Cubic Feet.

Canada.

No. Cos.	Rate.	No. Cos.	Rate.	No. Cos.	Rate.
1	$1 25	10	$2 50	8	$3 00
5	1 50	1	2 63	1	3 20
5	2 00	1	2 70	2	3 25
5	2 25	1	2 80	1	4 00

Price Received per Year for Public Lamps.

Canada.

Rate.	No. Lamps.	Rate.	No. Lamps.	Rate.	No. Lamps.
$13 80	160	$20 00	3932	$25 00	44
14 00	18	20 50	2417	27 00	55
15 00	902	22 00	244	28 00	126
15 50	126	22 50	47	30 00	92
16 50	29	22 75	173	40 00	67
18 00	20	23 00	142	2 50 per M.	60
19 40	275	24 00	184		
		Total number public lamps			9113

Public Lamps in United States, Maintained and Paid For in Varying Manner, as Stated in Headings.

No. Lamps.	Per Hour.	No. Lamps.	Per 1,000 Cu. Ft.	No. Lamps.	Each per Year.
356	$0 01	841	$1 60	528	$12 28
100	01½	1,833	1 65	726	12 50
142	00½	99	1 70	405	13 00
100	01½	4,311	1 75	43	13 40
		1,693	1 80	178	13 50
No. Lamps.	**Per Night.**	1,752	1 85	251	14 00
315	$0 05½	545	1 90	180	14 25
150	06	500	1 95	72	14 40
50	06½	5,688	2 00	500	14 50
215	09	900	2 25	107	14 72
5,100	13	44	2 35	269	14 75
25	04½	1,428	2 50	3,058	15 00
70	07½	104	2 65	50	15 36
		35	2 70	112	15 50
No. Lamps.	**Per Month.**	390	2 75	131	15 60
55	$1 00	89	2 80	2,000	15 63
416	1 75	564	3 00	485	16 00
		41	3 10	162	16 25
No. Lamps.	**Per 100 Cu. Ft.**	171	3 50	545	16 50
55	$1 00	21	3 60	1,222	16 66
		42	3 80	46	16 75
No. Lamps.	**Per 1,000 Cu. Ft.**	212	4 00	94	16 80
1,500	$0 55	11	5 00	763	17 00
2,800	71			70	17 15
1,407	75	**No. Lamps.**	**Each per Year.**	60	17 40
7,476	1 00	213	$6 00	116	17 41
5,161	1 05	25	8 00	19,035	17 50
671	1 20	85	9 60	959	17 75
7,000	1 23	186	9 78	58	17 76
40	1 25	176	10 00	400	17 80
5,769	1 30	129	10 50	7,478	18 00
1,856	1 40	70	10 71	1,703	18 12
24,844	1 50	2,802	12 00	68	18 50

No Lamps.	Each per Year.	No. Lamps.	Each per Year.	No. Lamps.	Each per Year.
103	$18 72	51	$23 50	1,033	$37 50
431	18 74	61	23 72	340	38 00
1,686	19 00	4,756	24 00	38	38 50
301	19 20	6,563	25 00	110	39 00
76	19 25	233	25 15	156	40 00
31	19 35	127	25 50	35	40 30
1,306	19 50	279	26 00	3	42 00
2,495	19 80	48	26 50	46	43 20
4,899	20 00	1,199	27 00	27	43 25
132	20 52	262	27 50	225	44 76
700	20 95	3,996	28 00	95	45 00
1,523	21 00	707	29 00	384	48 00
299	21 50	6,919	30 00	267	49 20
2,700	21 75	232	31 20	39	50 00
7,531	22 00	518	32 00	110	52 20
1,638	22 50	1,779	33 00	55	60 00
3,042	23 00	386	35 00	14	66 00
100	23 25	604	36 00	21	69 00
235	23 32	3,340	37 00		
37	23 40	121	37 20		

Total number of public lamps maintained in consideration of a fixed sum per lamp per annum equals 100,004, and the gross annual amount received for same equals $3,319,287.85, or an average price of $30.17 per lamp per annum. The total number of lamps annually maintained in consideration of rates of payment other than a fixed sum per lamp per annum equals 86,897. Adding the two we have a grand enumerated total of public lamps in United States equal to 186,901.

In order to more vividly appreciate the vast magnitude of the business of the gas manufacturers of our country, the quantities of material used in that manufacture, and the vastness of the product, I have made various forms of calculation which will present the subject in such shape as to be readily realized and understood. Few persons comprehend the magnitude of anything whose aggregate is presented to them in figures requiring the term billions, further than to understand that something very great or immense is meant; but when presented in a representative form or comparison these magnitudes are better comprehended.

The annual output of the 495 coal gas companies of the United States amounts to 17,502,305,000 cubic feet, and that of those in Canada to 629,500,000, or a total of 18,131,805,000 cubic feet, which required for its production about 3,817,222,105 pounds, or 1,908,611 tons, of coal, and would require 159,050 cars (each car having a carrying capacity of 12 tons) for its transportation. These, if divided into trains of 40 cars each, would equal 3,976 trains; and if the locomotive of each train touched the rear car of the preceding train, they would cover a track 903 miles long—allowing 4.4 trains to each mile. If the coal were placed on the ground it would form a road 6 feet wide, 1 foot deep, and 2,549 miles long; or would make a belt around the world about 8 inches deep and 12 inches wide.

In the matter of the residual products obtained from the distillation of the total quantity (1,908,611 tons) of coal annually carbonized, we have the following results:

Ammoniacal liquor, at 23 gallons per ton, equals 43,898,053 gallons, which, if turned into sulphate of ammonia, would produce 30,000,000 pounds.
Tar, at 12 gallons per ton, equals 22,903,332 gallons.
Coke, at .75 ton per ton of coal, equals 1,431,459 tons=43,943,770 bushels.
Benzine, at 1.1 pounds per ton, equals 2,099,472 pounds.
Aniline at 1.1 pounds per ton, equals 2,099,472 pounds.
Solvent naphtha, at 2.4 pounds per ton, equals 4,580,666 pounds.
Naphthaline, at 6.3 pounds per ton, equals 12,024,249 pounds.
Naphthol, at 4.75 pounds per ton, equals 9,065,903 pounds.
Yellow naphtha, at 9.5 pounds per ton, equals 18,131,804 pounds.
Creosote, at 17 pounds per ton, equals 32,446,387 pounds.
Heavy oils, at 14 pounds per ton, equals 26 720,554 pounds.
Anthracine, at .46 pound per ton, equals 877,961 pounds.
Alizarine, at 4.25 pounds per ton, equals 4,294,374 pounds.
Pitch, at 69.6 pounds per ton, equals 132,839,325 pounds.
Phenol, at 1.5 pounds per ton, equals 2,862,916 pounds.

The colors derived from the coal would dye to a full shade of magenta (at 300 yards per ton) 954,305,500 yards of flannel 27 inches wide. Naphthol (yellow, at 3,800 yards per ton), 7,252,721,800 yards flannel 27 inches wide. Aurine (orange, at 120 yards per ton), 229,033,320 yards flannel 27 inches wide. Alizarine (Turkey red, at 225 yards per ton) would dye 429,437,475 yards of calico.

The annual output of the 206 companies employing water or other processes equals 5,952,101,800 cubic feet, which would require for its production about 357,126,060 pounds (or 178,563 tons) of coal. That weight of coal would require 14,880 cars—capacity of each as before—for transportation. The trains, if allowed 40 cars to each, would number 372; and if the locomotive of each train touched the rear car of the preceding one, a track 84½ miles long would be occupied.

The quantity of oil used would equal about 29,760,505 galls., requiring to move it 240 trains, of 40 cars each, arranged as the coal trains were, and covering a track 56½ miles in length. The oil used would fill a main 751 miles long, and 13.56 in. diameter. The total quantity of gas manufactured would fill a main 13.56 in. diameter (equal to 1 sq.ft.) and 4,651,346 miles long. That is equal to 19 times the distance of the moon from the earth; or it would fill a pipe of same diameter that would encircle the earth 190 times, or would fill a single pipe leading from the earth to the moon having a diameter of about 59 inches. The total annual output of the 723 companies mentioned in this calculation in the United States and Canada—*i. e.*, using coal and other processes—equals 24,083,906,800 cubic feet, and would supply 4,816,781,360 5-foot burners for 1 hour. If each flame had a superficial area of 6 square inches it would support for one hour a flame having a total area of 200,698,456 square feet; or a band of flame one foot wide and 30,011 miles long, burning one hour; or a flash of flame, one second in duration, 1 foot wide, and 136,839,600 miles long—which would cover the distance to the sun 1½ times, or nearly a quarter of the earth's orbit. Again, it would make a flame having a width of one mile that would encircle the earth.

If it could be converted into energy through the agency of a gas engine, 1,094,723,036 horse power would be developed, which would be capable of raising 36,125,360,221,000 lbs. 1 foot high in a minute of time; or would raise one pound 6,842,018,975 miles in one minute of time; or would project a ball, weighing 74 lbs., into the sun in a similar period of time. If it were possible to obtain the velocity which would be the result of this projection, it would equal 1,533,333 miles per second, or about three times greater than the velocity of light, which is reckoned at 182,000 miles per second.

Companies to the number of 295 remain to be accounted for, 723 having been considered in the foregoing estimates. Placing the annual output of the 295 companies at one-half the average of the companies we have considered, we see it will equal about 4,913,372,000 cu. ft., which at $1.75 per thousand, possesses a money value of $8,600,000. Now, the 24,083,906,000 cu. ft. output of the 723 companies was worth $42,447,812.25, and adding thereto the estimated output of the 295, we have a total make of 28,997,528,800 cubic feet, with a value of $51,047, 812.25.

In order to give some further idea of the magnitude of the business I have placed the capital required to carry on this vast enterprise at $9 per 1,000 feet of output, which will equal about $261,065,502, or nearly $5 for every man, woman and child in the country. Certainly, these figures show somewhat of the vast magnitude of the business in which we are engaged, and entitle us to more consideration than we receive at the hands of those we are trying to serve by untiring efforts to give them good and cheap gas, and the benefit of all improvement that helps to cheapen its manufacture. We often hear people talk of the outrageous imposition of gas companies in charging exorbitant prices for gas. If the figures herewith submitted do nothing else they certainly disprove that charge.

In conclusion, I trust my humble efforts have demonstrated to you that we have a business possessing a magnitude greater than any of you supposed—it certainly exceeded my ideas—further, that it is one we may well be proud of, and is worthy of our best efforts to perfect in every possible way.

Mr. Fodel—I do not think the Association cares to discuss the statistics which have been presented by Mr. Goodwin—interesting though they are—and, therefore, I move a vote of thanks to him for his paper. I also move that 700 copies of the paper be printed in pamphlet form for distribution among the members of the Association. (Both motions were agreed to.)

The Preparation of Papers.

Mr. McMillin—Our President, in his inaugural address, made one very important suggestion when he proposed that the Executive Committee be empowered to select persons to prepare papers for each annual meeting. The Committee on President's Address, in considering the matter, thought it best to bring the question up separately, or independent of their general report on the address, to the end that the merits of the plan might be thoroughly discussed. In order to bring it formally before you I offer the following resolution, without, however, at present wishing to say that such presentation necessarily commits me in favor of it:

"*Resolved*, That the Executive Committee be and is hereby instructed to make selection of, or to designate, not less than ten members of this Association, who shall be requested by said Executive Committee to prepare papers upon subjects to be selected either by the Committee, or by the members—in the latter case approval by the Committee must be secured—and that the persons designated to prepare papers shall be notified of their selection, and of the subjects on which they are expected to write, not less than 90 days before the date of the next annual meeting." (Seconded by Mr. Thomas.)

Mr. Beale—I think a period of 90 days is a pretty short time to grant for the preparation of a paper, particularly if the writer has much to do in the line of research. I therefore move to amend by inserting six months in lieu of 90 days. (Amendment accepted by Mr. McMillin.)

Mr. McMillin—Although I offered the resolution I am not prepared to say I shall vote for it. It is proper that the subject should be discussed, and a resolution submitted to the Association as a suggestion coming from the President. I will say in its favor that that is the practice of the Ohio Association. In that Association the Executive Committee select the subjects and designate the persons who are to write on them. You who read the American Gas Light Journal know that the Ohio Association has a much larger percentage of papers read at its annual meetings, its membership number being duly considered, than any other Association in the country. It does not seem to have any trouble in getting papers, and we will omit for the present any consideration of their quality. While that is true, and while such is our experience in the Ohio Association, I yet have very serious doubt of the success of that plan in this Association. I fear those who may be selected will not respond, and also that there may be a delicacy upon the part of others, in the matter of preparing and presenting papers, unless they have been specially selected to do so. In fact the latter doubt is so strong in my mind that I am not prepared to say that I would vote for the resolution which I have offered. I think it well to discuss the matter a little before voting on it.

The President—I think two or three years from now, or when Mr. McMillin has been elected President of this Association, he will have cause for regret if the resolution does not prevail. At present he cannot understand the vexation and trouble encountered by the President and Secretary, for the time being, in persuading members to consent to read papers.

Mr. Stiness—Is not six months rather a long notice to give? In such a living age as this, when so many things occur within a day, it seems to me that to select a subject six months before the meeting of the Association would have a tendency to make our papers somewhat stale, or at least hardly up to the times.

The President—I quite agree with Mr. Stiness. I think that the 90-day period fixed in the original resolution affords ample time.

Mr. Beale—If one is already in possession of the facts and figures, 60 days would afford ample time in which to prepare a paper; but if the writer had, for instance, to introduce a series of experiments in order to get at the facts, another phase would be presented. A man cannot do very much in the way of original investigation in 90 days.

Mr. McMillin—I might add the resolution provides that the Executive Committee shall select not less than ten persons to write papers. If any "new process" were sprung on us between the date of the appointment and the next meeting they would select a new man to write a paper.

Mr. Lansden—I very much doubt the policy of limiting the number of papers to ten at each session, as is proposed by this resolution. It doubtless will often occur that other subjects of interest than those selected by the committee, concerning the gas industry, will be brought to the attention of the members; and it might be very desirable that additional papers, and on different subjects, should be added to the list made up by the Executive Committee. I think, too, if we adopt this plan of having the Executive Committee name the members who are to prepare papers for the next meeting, it will have a tendency to repress other members who otherwise would gladly write papers on special subjects which had been brought to their attention, or on new facts which were the result of their experiments.

The Presidant—This resolution does not shut off anybody from presenting papers. It simply insures the presentation of a certain number of papers at each meeting.

Mr. Beale—I would like to suggest to the Executive Committee that the members would appreciate the distribution of printed copies of the papers in advance of their reading, or to at least furnish each member with a printed copy of the paper just before it is read, so that the members may be able more readily to follow the reader. Not only in this hall, but in other halls as well, I think a large number of the members present are frequently unable to follow the reader. In this hall quite a large number of the members have been unable to hear a single word of some of the papers which have been read.

The President—The question before the Association is on the resolution as offered by Mr. McMillin.

Mr. Stiness—I move to amend by making it 90 days instead of six months.

The President—Will Mr. McMillin accept that amendment?

Mr. McMillin—That suits me very well. I am ready to accept any amendment suggested.

The President—Then, as Mr. McMillin accepts the amendment, the resolution stands as at first proposed.

Mr. Greenough—I would suggest, as an amendment to the resolution, that the Executive Committee shall call for five instead of ten papers. We would then be sure of having five good papers, and if others had papers to read they would not then feel they were taking up too much of the time of the Association in presenting them. We would be sure of having five good papers as a starter.

Mr. Littlehales—I agree with Mr. Greenough's suggestion. I am sure that

the time at the disposal of the Association would be inadequate to a consideration of ten papers, therefore I think that five would be better.

Mr. McMillin—I will accept the suggestion also, and insert "five" in lieu of "ten."

The President—The resolution, in amended form, reads:

"*Resolved*, That the Executive Committee be, and is hereby instructed to make a selection of, or to designate not less than five members of this Association, who shall be requested, by said Executive Committee, to prepare papers upon subjects to be either selected or approved by the Committee; that the persons designated to prepare papers shall be notified of their selection, and of the subjects upon which they are expected to write, not less than 90 days before the date of the next annual meeting." (The resolution was adopted.)

The Association ordered a recess, to terminate at 2 o'clock, P.M.

(To be continued.)

A Chapter on Practical Gas Making.

By Frederic Egner.

As to whether cannel or oil (any product of petroleum is meant in the case of the latter) is the better agent for enriching coal gas is still an undecided problem with many gas managers; hence it is the writer's aim to herewith present certain facts that may aid the reader in arriving at a conclusion in respect of the mooted point. Since like causes must produce like effects, the object of this article will be to present the conditions which led to the annexed tabulated results, so that the reader, having made due allowance for local conditions and varying circumstances, may be in position to decide with certainty which of the two—cannel or oil—will answer best to the requirements of his individual case.

The works in which the results about to be described were obtained are those of the Laclede Gas Light Company, of St. Louis, Mo. They were designed and erected by that well-known architect and gas engineer, Mr. Wm. Farmer, of New York city, and may be held out as a model plant in most respects, the exception to perfection being, in the writer's opinion, chargeable to the fact that the retort benches were originally constructed to only admit of the use of retorts of the limited length of 8 ft. 6 in. They were oval in shape, 22 in. by 14 in.; and for these your correspondent subsequently substituted D's, 24 in. by 14 in. It might be said that the plant had a per diem output capacity of two million cubic feet. The kind of coal carbonized is mentioned in the tables, and the oil was of the sort known as "gas naphtha," showing 62° Beaume at 60° F. At one time some crude petroleum was used, but not enough to affect the general result. A Bunsen-Letheby photometer was employed, and the burner answered to that known as Sugg's London Argand No. 1. The retorts, size previously noted, were heated by ordinary old-style furnaces, consuming, on an average, 21,000 pounds of coke in 24 hours. The settings were in sixes and fives, one-half in each class. Practically the same men attended the benches in both cases, the only difference being that the results given in the first table were gained when the works were under the superintendence of Mr. J. C. Zabriskie, while those in the second were obtained when the plant was in my own charge. It should be stated right here that Mr. Zabriskie was a graduate, so to speak, of the old Manhattan Gas Light Company of New York city, which in itself is a fair recommendation as to ability; in fact, he was a careful manager, who made every item tell. If the results in Table II. seem better, it is not because the retort house received increased or better attention, for it was as well looked after in the first instance as could be possible under the circumstances.

Having mentioned the prevailing conditions, the following table, showing a twelvemonth's working with coal only, is presented.

Table I.

1882.	Cu. Ft. Gas Made per Pound Coal.	Cu. Ft. Gas Made per Retort in 24 Hrs.	Candle Power.	Kind of Coal Used.	Per Cent. Cannel Used
January	5.03	6,471	16.01	P. and V.	11.11
February	5.12	6,649	16.44	P. V. I.	10.87
March	5.17	6,700	16.00	P. I.	8.63
April	5.27	6,832	15.52	P. V. I.	7.03
May	5.32	6,887	15.20	P. I.	6.48
June	5.35	6,937	15.35	do.	5.86
July	5.35	6,925	16.48	do.	5.41
August	5.32	6,915	16.46	do.	5.87
September	5.25	6,814	17.24	P. V. I.	9.03
October	5.25	6,804	17.04	do.	10.08
November	5.14	6,666	16.49	P. I.	10.80
December	5.15	6,690	16.25	P. V. I.	14.16

Remarks.—P. stands for Pittsburgh or Youghiogheny gas coal. I. stands for Indiana block or cannel coal. V. stands for Cannelton cannel.

But the people were unsatisfied with 16-candle power gas, and therefore a richer illuminant had to be furnished them; but in the works under consideration, as the cannel coal had to be carbonized in separate retorts—because of the coke trade, and because the cannel coke brought much lower prices than that produced from the caking coal—it was decided to try oil as an enricher, with the following results:

Table II.

1885.	Cu. Ft. Gas Made per Pound Coal (and Oil).	Cu. Ft. Gas Made per Retort in 24 Hrs.	Candle Power.	Kind of Coal Used.	Gallons of Oil Used per Ton Coal
January	5.65	8,280	19.64	P. $\frac{3}{4}$, I. $\frac{1}{4}$	12.7
February	5.75	8,761	19.60	do.	14.3
March	5.60	8,319	19.85	do.	12.9
April	5.96	8,763	20.48	do.	14.7
May	6.38	9,323	20.57	P. $\frac{2}{3}$, I. $\frac{1}{3}$	17.6
June	6.65	9,759	19.75	do.	17.9
July	6.43	9,403	18.45	do.	14.6
August	6.30	9,298	19.05	do.	17.3
September	6.51	9,542	19.68	do.	16.1
October	6.26	9,549	20.03	do.	14.3
November	6.03	8,893	20.11	do.	14.3
December	6.10	8,912	19.83	do.	16.1

Remarks.—P. stands for Pittsburgh or Youghiogheny gas coal. I. stands in this case not for cannel, but Indiana caking coal. The fractions designate the proportions of each kind of coal used.

Carbonized by itself, the Youghiogheny coal yielded 4.90 cubic feet of 16-candle gas; and the Indiana caking variety gave off 4.25 cubic feet of 14-candle gas per pound, and cost one-third less than the Youghiogheny. Prior to using the oil we had much difficulty with naphthaline at holder inlet, in the connections about the works, and in the street mains. Shortly after using the oil we were able to cut down our street main pressures by 17-tenths on ordinary nights and 12-tenths on Saturdays, and instead of naphthaline we would pump about three barrels of heavy oil per week out of our street drips. That was carried to the works and used up in the ordinary way.

The method of employing the oil was simple enough. A tank holding 150 gallons was placed on an elevated platform *outside* of the retort house wall, and the oil was pumped into it as occasion required from a distant storage tank. A 1-inch pipe ran through the wall from the small tank and into a branch pipe that distributed the oil to the retorts. With 120 retorts in action we would operate four oil retorts—one each in as many benches, the remaining retorts in the benches being charged with coal in the ordinary way. The oil retort would be kept at a dull red heat, except when crude oil was used. No matter how hot the rest of the bench was, the heat of the oil retort could be kept at the requisite state by regulating the quantity of oil fed in. Using the naphtha previously mentioned, 11 gallons per hour was the average quantity which the oil retorts would decompose; but of the crude petroleum only 8 to 9 gallons could be run through each hour. An oil retort would remain in action from 6 to 8 weeks before it needed scurfing, working constantly in the meantime, save for an occasional stopped standpipe, which would be cleared in the usual way.

The use of oil at first met with earnest and honest opposition from some of the officers of the Company, who called in question the economy of the practice; but, however, time has proved that economy was with the oil, and that proof (it was remarked that the opposition was an honest one) stifled all complaint at the end of a two years' trial.

The results for the three named months in 1886 are here appended:

Table III.

1886.	Cu. Ft. Gas per Pound Coal and Oil.	Cu. Ft. Gas per Retort in 24 Hours.	Candle Power.	Gallons of Oil Used per Ton Coal.
August	5.48	7,712	19.51	4.40
September	5.43	7,806	19.66	4.80
October	5.55	8,141	19.88	4.40

Remarks.—Coal used, Youghiogheny caking. Oil, as previously described. Oil used includes that lost by evaporation, leakage, etc.

From the above it will be seen that less oil per ton of coal was used than during the previous year; but it was discovered by the opponents of the oil-enriching plan, now that the year had about terminated—and it was also frankly admitted by the adherents of the policy—that the gas cost less than when a greater quantity of oil was employed. It was also found that naphthaline had again reappeared in the street mains; and, further, in order to supply at sufficient pressure, an increase in same of 5-tenths had to be made at the works.

The coal was again tested by itself, and shown to produce 4.89 cubic feet of 17-candle gas per pound—equal to 10,953 cubic feet per gross ton. If, however, we take the September figures from the above table, we will find that by employing 4.8 gallons of oil per ton of coal we obtained a yield of 12,163 cubic feet of 19.66-candle gas. The same meter was used in each instance. Thus, in the use of oil as an enricher we not only gained 2.66 candles in illuminating power of all the gas made, but also augmented the yield by 1,210 cubic feet—or a gain of 252 cubic feet of 19.66-candle gas per

gallon of oil used. Not only that, but the plan helped to clear our mains from naphthaline, and lessened the retort house labor besides.

That should properly end this chapter; but it might be added that coal—and caking coal at that—contains its own enricher, if only worked in the proper way. We have obtained over 6 feet to the pound, of fully 22-candle gas, from a caking coal which yielded only 4.25 cubic feet of 14-candle gas when working under the old system. This can be proved by others than the writer; but, perhaps, more on that score hereafter. It is hoped the figures given may be of interest to the readers of the JOURNAL, and, let it be added, of profit as well.

The Westinghouse Electric Lighting System.

The following article on the above-named subject appears in the December issue of the *Electrician and Electrical Engineer:*

Much interest has been excited in electrical circles by the editorial announcement made in our last issue respecting the success of experiments recently made with the system of electrical distribution by induction, which is about to be introduced by the Westinghouse Electric Company of Pittsburgh, Pa. This interest has been heightened by statements which have appeared in the public press purporting to set forth some of the results which had been attained. Having been permitted to examine the apparatus in actual operation, we purpose at an early day to present our readers with a detailed description of the plant; meanwhile a brief statement of the facts, which may be relied on as being accurate, so far as it goes, will doubtless be of interest.

The test which we witnessed was made in Pittsburgh. The dynamo was located in the factory of the Westinghouse Electric Company, on Duquesne Way and Garrison alley, Pittsburgh, and the lamps were situated at a distance of 3 miles from the generator in a suburb of the city best known as Lawrenceville. The conductor used was No. 4 B. W. G. copper wire, 6 miles in length out and back, and having a resistance of 6 ohms. The generator is of the alternate class, and was originally designed by William Stanley, Jr., some of the details of the present model having been worked out by Messrs. Westinghouse, Shallenberger, Byllesby, Schmid, and others. It is a remarkably well designed, efficient, and handsome machine. The body of the armature is cylindrical, 23 inches in diameter and 12 inches face and is formed of discs of iron magnetically separated from each other, the conducting wire being wound in flat coils upon its face. The field magnets, 16 in number, are arranged in a circle, with their poles facing inward toward the armature and in close proximity thereto. The dynamo is driven at the rate of 1,080 revolutions per minute, thus giving 17,260 alternations of the current per minute, or 288 per second. The weight of the entire machine is about 7,000 pounds, and the total weight of copper wire on the armature and field magnet about 800 pounds. The potential at the terminals of the dynamo when running is maintained at about 1,100 volts. An independent exciter is employed for the field, consisting of a small Stanley direct current dynamo of 150 volts and 10 amperes, driven at 1,800 revolutions per minute. The alternate dynamo and exciter are both belted to the shaft of an 18 by 16 Westinghouse automatic engine, rated at 200 horse power and making 276 revolutions. The potential at the terminals of the main conductors, 3 miles from the dynamo, is 1,000 volts—showing a drop of only 10 per cent. The inductoriums, or "converters," as they are technically called, are placed at the point of consumption, and have their primary wires attached to the main conductors and their secondary wires to the leads which extend through the premises to be lighted, and to which the lamps are attached in the usual manner. In the present installation each converter contains 112 pounds of iron and 43 pounds of copper, and is capable of supplying 50 sixteen-candle incandescent lamps at a potential of 100 volts. In one long-continued test 850 lamps, and in another 1,000 lamps, were lighted to their full candle power on this circuit, and the high commercial efficiency of the system as a whole may be estimated by the result which was obtained of a little in excess of 8 lamps per indicated horse power.

It will be seen from these data that not more than one pound of copper per mile is required for each lamp in this system. It is easy to estimate the immense saving in the cost of installation of an electric light plant which is capable of being realized by the use of this invention. The system of the Westinghouse Company as now perfected is based upon the fundamental patents of Messrs. Gaulard and Gibbs, whose apparatus has for some time been in successful use, though only to a limited extent, in England. Many modifications and improvements have been added to the original system by Mr. Westinghouse himself and by Messrs. Stanley, Shallenberger, and other electricians of the Company. The remarkable results which we have above chronicled are in fact the outcome of more than a year of elaborate and costly experimentation by a number of the ablest electricians in the United States. We shall publish further details of this interesting system at an early date.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

AN INTERESTING LETTER.—Mr. Thos. D. Gilbert, who for years has, with credit to himself and profit to his associates, acted as Secretary of the Grand Rapids (Mich.) Gas Light Company, recently forwarded us a most interesting letter; and since the gentleman did not therein express a desire that its contents should not be divulged, we think its reproduction will afford that pleasure to our readers which it imparted to us. Secretary Gilbert says; "I send you herewith a list of prices adopted by the Grand Rapids Gas Light Company for next year. In accordance with the traditional policy of this company to fairly divide with its customers the benefits derived from increased output, economies in production, etc., we have, during the last five years, reduced our scale of prices on four different occasions, which policy, I may add, in no case resulted in a net loss of revenue; and that, too, in face of the competition of an enterprising local electric lighting company. We know this to be the best policy—to say nothing of the justice of it—for all gas companies to pursue; and, for that matter, it may well be applied to most of other classes of business. A varying price, or one to correspond with rate of consumption, does not meet the approval of some of our prominent gas managers; but as the manufacture and sale of gas is a purely commercial business, and as the before-mentioned principle is recognized to be just in all other classes of business, why not so in ours? No gas company can afford to furnish, set and maintain 100 meters to register 50,000 cub c feet of gas in a month, with all the attendant expense of making out and collecting bills, 100 separate accounts on your books, etc., etc., at the same price that would be charged to a single individual who used an equal quantity each month through a single meter. It does not seem as though this point (it appears so plain) needed argument." We cannot add anything to the justice and force of Mr. Gilbert's reasoning by commenting thereon, and in fact our columns have often contained similar deductions and advice. The appended lines show the gross and net rates which will obtain until further notice, in Grand Rapids from and after 1st proximo:

	Gross.	Net.
A monthly consumption above 20,000 cu. ft.....	$1.50	$1.20
" " between 10,000 and 20,000 cu. ft.	1.50	1.30
" " " 6,000 and 10,000 "	1.60	1.40
" " " 1,000 and 5,000 "	1.70	1.50
" " less than 1,000 cu. ft.....	2.50	2.00

The net rates will not be allowed unless accounts are settled within 15 days from date of presentation. The Grand Rapids gas men make a specialty of prepared coke, and in consequence enjoy a steadily growing trade in that residual, for which fairly remunerative prices are received.

AN ITEM FROM SEWICKLEY, PA.—Mr. Forbes informs us that, on November 29th, the owners of the Sewickley Gas Light Company contracted with the American Gas Improvement Company for the erection at the former place of the McKay-Critchlow apparatus for carburetting natural gas. The Sewickley folks were averse to changing from the coal gas system, but the natural gas suppliers threatened to enter into the Sewickley territory as dispensers of an illuminating vehicle, hence the "deal." Under the terms of the latter the Sewickley Company is to pay ten cents per thousand cu. ft. for the necessary quantity of crude natural gas, which, when carburetted and "fixed," will not be so cheap after all. The McKay plant will not be in working order much sooner than by February, 1887. Mr. Forbes also says: "We are now selling at $1.50 per thousand cubic feet, but intend soon to make a reduction. It is rather uphill work with us here, for Sewickley is merely a suburb of Pittsburgh, only thinly built up. We have over 12 miles of street mains in the ground, and on October first we had less than 200 consumers on all our lines. In fact the neighboring members of the gas fraternity have often expressed wonder as to how we managed to keep afloat; but we have kept out of debt, and have always mustered up enough cash to declare and pay dividends at the regular time for such disbursements. Our stock, as a result, has never changed hands at a lower rate than par, and but very few shares of it have made their appearance on the market." That is what troubles intending investors, who are ever on the outlook for "good things"—dividend paying shares of the regulation, humdrum type are favored by a firm grip of their owners.

DOING BUSINESS ONCE MORE.—The Consumers Gas Light and Fuel Company, of Chicago, Ills., has been legally rehabilitated, and is "again doing business at the old stand, under the old name," and it is to be presumed under the "old process," too, for we have account of two fatal cases of gas suffocation that recently occurred in the "city of sin." Our readers will probably recall the sale made on July 15th, by the Master in Chancery (Mr. Sherman), when all the belongings of the Consumers Company were disposed of for (if our memory serves aright) the sum of $1,950,000, the purchaser being Mr. J. T. Lester, who acted for a syndicate. About two weeks ago Mr. Lester transferred, formally, the property nominally in his possession to

the stockholders in the present combination, among the heaviest of these being Messrs. Kent, Cummings, and Reyburn, who were also largely interested in the shares and bonds of the original company. In fact they composed the syndicate on whose behalf Lester bid in the "belongings" at the July auction. The consideration mentioned in the Lester transfer is the mere bagatelle of eight millions of dollars. Mr. C. E. Judson, who acted as receiver when the old company went into bankruptcy, has been named President of the revivified enterprise, and it is not expected that any material change in management will be made.

CHEAPER GAS FOR ZANESVILLE, OHIO.—Mr. Eugene Printz, Superintendent of the Zanesville Gas Light Company, informs us that his directors, at a meeting held November 24th, decided to add another reason why the residents of the capital seat of Muskingum county should have cause to be thankful on the Thanksgiving Day of 1886. The matter assumed the shape of a reduction in the selling rates for gas, the new schedule to become operative on the first day of current month. The prior charge ($1.50 per thousand) could not be looked upon otherwise than favorably therefore the latest concession ought to merit exceptional praise, which will probably take the practical shape of a decided increase in the Company's future annual output. Last year's total sendout approximated to 31 millions cubic feet, and it is more than likely that the ensuing year's business will show a decided augmentation over that of its predecessor. The new schedule calls for a payment of $1.30 per thousand cubic feet, and applies to all grades, no discrimination being made in regard to monthly consumption quantities. Mr. Printz has been putting his house in order, and in fact can now boast of an establishment well equipped for the duty expected from it. Four old-style benches were leveled and replaced by an equal number of benches of sixes to be fired on the regenerative principle, with new connections, etc. The distribution system was overhauled, and the latter work included the substitution of something over three miles of mains of a larger size than those formerly in duty. Mr. Printz and the proprietors of the Zanesville Company are evidently desirous of speedily reaching the dollar notch, and, from present indications, are certain to "git thar" pretty soon.

THE LAMPS SELL READILY.—Mr. Geo. H. Gregory, who manufactures the "Retort Incandescent Gas Lamp," has met with great success in introducing his specialty to the gas men of this country. Not long since he showed to us a transcript, taken hurriedly and at random from his order book, that contained the names of 31 different gas companies now supplying the Gregory lamps to their consumers. Large and small companies were represented in the list, and that diversity of location was thoroughly illustrated will be perceived when it is mentioned that Maine and Montana mark the respective boundaries of the section within which his wares were distributed.

STILL SPREADING.—The evident desire to operate combined gas and electric lighting plants in the New England States shows no sign of abatement. If anything, the idea seems to become more strongly fixed with the passing of the days. Among the latest movers in this direction that we have positive information of is the Newburyport (Mass.) Gas Light Company, whose proprietors have filed a petition with the Legislature in which they ask for the necessary power to enable them to supply electric light in that city. In this connection it may interest our readers to look over the following copy of the Act of the Massachusetts Legislature (approved June 30, 1886), which authorizes the Woburn Gas Light Company to furnish electric light. We presume it may be accepted as a type of this kind of legislation: "Be it enacted, etc.: *Sec. I.*—The Woburn Gas Light Company, in addition to the rights and powers conferred upon it by its original act of incorporation, is hereby authorized to furnish the inhabitants of the town of Woburn with electric light. *Sec. II.*—The said corporation, first having the consent in writing of the selectmen of the said town, is hereby authorized, under the direction and control of the said selectmen, to dig up and open the grounds in any of the streets and highways thereof, so far as is necessary for the purpose of laying lines of wire to carry into effect the authority hereby given, and for the purpose of keeping the said lines in repair; and to erect and maintain lines of wire upon or above the surface of said streets and highways. *Sec. III.*—The selectmen of said town may regulate, restrict and control all acts and doings of said corporation which may in any manner affect the health, safety, convenience or property of the inhabitants of said town; but such consent shall not affect the right or remedy to recover damages for an injury caused to persons or property by the doings of said corporation under the authority herein given. The said corporation shall put all streets and highways that are opened into as good repair as these were in when opened, and upon failure to do so within a reasonable time shall be deemed guilty of a nuisance. *Sec. IV.*—When a party injured in his person or property by a defect in a street or highway, caused by the operations of said corporation in laying down, erecting, maintaining or repairing its lines of wire, or otherwise obstructing such streets or highways, recovers damages therefor from the town wherein such injury is received, such town shall, in addition to the damages so recovered against it, be entitled to recover all taxable costs of the plaintiff and defendant in the same action, in a suit brought against said corporation, if said corporation be liable for said damages, and if reasonable notice is given by such town to it, so that it may defend the original action. *Sec. V.*—Except as hereinbefore expressly provided, said corporation shall have all the powers and privileges, and be subject to all the duties, restrictions, and liabilities set forth in all general laws which now are, or hereafter may be, in force relating to electric light companies." Certainly, this sort of especial authorization entails no very onerous condition or restriction upon the receivers thereof.

AFTER THE THIRTY-FIRST DAY OF DECEMBER.—According to Chapter 346, of the laws of the State of Massachusetts, entitled, "An Act in Relation to Gas Companies," which measure received official sanction on June 30th last, all gas companies in that State are directed to furnish a description of meter to their consumers which shall register the quantity of gas passing through it in cubic feet "only," so that the number of cubic feet of gas consumed can be easily ascertained by the consumer of such gas; and no meter shall be used that may confuse or deceive the customer as to the number of cubic feet of gas he has consumed, or as to the price he pays for the same per thousand cubic feet; and no rent shall be charged for use of meter when the consumer uses gas to the value of seven dollars in any one year." Therefore, Massachusetts decrees banishment of the "dollar-and-cent" meter, as well as other meter innovations, from her precincts, which will not cause any loudness of lamentation; but it does seem as if the meter rent clause would be nearer to equitable adjustment were the limit raised to at least $12 per annum, or when the monthly consumption would average a dollar in value.

VALUES OF NEW ENGLAND GAS SHARES.—Gas shares in the Eastern States, taken on an average, show quite an advance in value when present quotations are contrasted with those that ruled a twelvemonth ago. Connecticut and Massachusetts hold the lead in this respect, but Rhode Island is not far behind her "bigger sisters." In Massachusetts, perhaps, the advance in quotations cannot be regarded as an unmixed blessing, since it is the custom of the Bay State assessors to tax the capital stock of manufacturing industries on the basis of the price which these respective shares brought at auction within certain specified dates. In Massachusetts shares, at a session of the Boston Stock Exchange, held towards the close of last month, we note the following transactions: 4 shares Malden and Melrose gas, at 105¼; 4 Marblehead gas, at 105¼; 1 Cambridge gas, at 165; and 5 Roxbury gas, at 190¼. To this we may add that a general review of the gas share situation over the entire country presents most gratifying features, and there can be no question that the gas share proprietors have solid reason for belief in the future of their investments. As to Canada, we can best illustrate the prevailing situation by publishing the following sample quotation of shares of Consumers Gas Company, of Toronto, whose managers are now selling gas at very cheap rates—see JOURNAL, Nov. 16, p. 303—which represents the state of market on Nov. 30, 1886: Consumers gas, bid, 195½; asked, 198—fully ten points in excess of prices in 1885.

MR. UPSON SAID SO.—Mr. Upson, who acts as Lamp Inspector for the municipality of New Haven, Conn., it seems ate his Thanksgiving dinner this year in the City of Churches, otherwise known as Brooklyn, McLaughlinville, Prattsville, etc., and while there devoted some attention to the method of street lighting in vogue. Now, the street lighting situation in Brooklyn is decidedly mixed. The "ring," or many members thereof, were at one time deeply interested in the financial welfare of the local gas companies, but somehow or another, possibly on account of having parted with their holdings in gas shares, certain of the ringsters, and now the most potent in the combination, conceived a decided passion for electric lighting, and, so far at least, have been remarkably successful in their attempts to convince the lighting committee of the Common Council that the gas lamps should be displaced by arc lights. At any rate, and to come back to Mr. Upson, he had no lack of opportunity for investigation during the spare moments of his visit, and such study appears to have convinced him that New Haven attempted too big a contract when the municipality determined to substitute one arc light for eight gas lamps. This is what Mr. Upson said, on his return to the Elm City: "I believe we made a mistake in putting out so many gas lights. We want more light. The electric light 'throws out its illumination at angles, and will not throw its rays around a corner,' consequently the gas lights are required at street corners. I am to replace (*sic*) some of these discontinued lights," and then he goes on to enumerate the situations. After awhile perhaps Upson will manage it so that New Haven will once again be lighted as well as during the period when gas lamps held full sway.

CHEAPER GAS FOR EAST BOSTON, MASS.—Mr. Jno. H. Burnham, Supt. of the East Boston Gas Company, informs us that from and after first prox.

the selling rate for gas is to be $1.75 per thousand cubic feet, equivalent to a reduction of ten cents per thousand. If we mistake not this is the second concession made by the Company within a twelvemonth, the $1.85 rate having been made on April first of current year.

THE BOSTON COMPANY JOINS THE PROCESSION.—Mr. M. S. Greenough paid us a visit the other day, and, in course of conversation, he said that the Boston Gas Company had, on December 4th, served notice of an intention to petition the Massachusetts Legislature for authority to engage in the electric lighting business. Mr. Greenough thinks it good policy to be forearmed rather than to be forestalled. Sound enough logic, of course; but the proof of the pudding is in the eating of it.

THE STOCK WAS DOUBLED.—Pursuant to the formal call a meeting of the stockholders of the Chesapeake Gas Company, Baltimore, Md., was held in the Company's office on date of November 30th, Mr. E. C. Benedict acting as President. The Chairman explained the business to be transacted which referred to the proposed increase of the Company's capital stock from one and a half to three millions of dollars. A resolution to that effect was offered by Mr. R. D. Morrison, and it met with a unanimous response, 13,000 shares voting out of a total of 15,000. The nominal intent of the increase in capital is to provide for doubling up the capacity of the plant. It is claimed that the necessary real estate has been purchased, and that the conduit extension is already in progress. Poor Baltimore! it still possesses the Husted, etc., gas legacies.

PATERSON (N. J.) STREET LIGHTING ARRANGEMENTS.—Paterson, it is said, maintains 54 arc lights, 417 gas, and 1,006 gasoline lamps. These cost, respectively, per annum, $8,000, $9,272.50, and $12,719. The electrical promoters offered, as an inducement to secure their original grant, that each arc would displace 5 gas lamps; but in reality the displacement effected was in the ratio of one arc to four gas lamps. The annual prices paid for each description of lighting service are quite suggestive, and perhaps Paterson will excuse us for saying it is quite time that her authorities parted with their fondness for the fitful gasoline glare.

BIDDING FOR THE PHILADELPHIA (PA.) GAS WORKS.—Dolan, Barker, *et al* (where is Mister Gibbs in hiding just now?) are not likely to have a walkover in the race for possession of the Quaker City gas works, for the entry lists show the nomination of several promising candidates that are certain to make strong running in the final effort to secure the verdict of "first past the post." A special to the New York *Tribune*, bearing date of Nov. 8 says: "The several syndicates who have offered to lease the city gas works were startled to-day by the proposition of Jno. Wanamaker, who offers to take the works for 25 years, guaranteeing to pay a rental each year of not less than $1,000,000 for the full term of the lease, and, for the first five years, a sum each year equal to one-half of the profits without deducting the cost of extension and new improvements, on which he agrees to expend a specified amount. For the remaining 20 years he offers to pay a sum each year equal to three-quarters of the net profits, which will enable the city to reduce the price of gas to consumers if it desires. He further agrees to return the works at the end of ten years if Councils so desire. This offer is by large odds the best yet made." It does seem, when the Trust's gas plant is so eagerly coveted by outsiders, that the people of Philadelphia ought to be able to reap greater benefit than anyone else from its operation; hence they should keep their property and thus retain all the profit. In any event, if the plant must be disposed of, why not draw up a contract setting forth the terms under which the sale is to be made, and then offer the franchise, etc., at public auction. If the Philadelphians are wise they will eventually determine to refuse the Dolan-Barker mess of gruel, and keep a birthright which is as good as gold—in fact it is gold.

WACO NOW WANTS GAS.—Waco, Texas, not long since wanted the light of the future for its streets, and finally secured it in the shape of a pretty bad specimen of the Jenney type, supplied at a cost absurdly high. Now the local press speak unanimously on the demerits of the service, and the *Examiner* man fairly fumes. Here is what he said recently: "Patience has long ceased to be a virtue as applied to the miserable apology for a light which we are now paying a good round figure. It is a shame, a humbug, a mere pretense, and it ought not to be tolerated a moment longer. The Council should at once throw over the Jenney. It has complied with no single provision of the so-called contract, and there is not the slightest moral or other obligation that we continue to pay this company for a light which it most certainly does not furnish." The Waco Gas Company has been reorganized, and the plant has been practically rebuilt within the year. Its proprietors recently offered to supply 100 lamps to the city at an annual total charge of $3,000—in regard to that proposition the *Examiner* man said the city would under it get ten times more light, at one-half the cost, than that vouchsafed under the Jenney plan—or to maintain 200 gas lamps at a total annual charge of $5,000. We have not heard what action was taken in the premises by the Council, but expect to have a word or two to say on the subject in our next issue.

ATTEMPTING TO REGULATE GAS PRICES.—The Joint Committee of Aldermen and Council of Cincinnati, Ohio, at a session held December 7, recommended the passage of an ordinance fixing selling rate for gas in that city for the next ten years at the net figure of $1.25 per thousand cubic feet. Messrs. Reedy and Wuest voted against the ordinance on the ground that it contained no specification as to candle power. The vote (there are ten members in the Joint Committee) was 8 in favor, 2 opposed. Oh! How the "pink un" yells, etc.

FREE GAS.—According to the terms of the charter originally granted the New Orleans (La.) Gas Light Company—framed over 50 years ago—the grantees agreed to furnish gas to the Charity Hospital without making any charge therefor. If we are not in error, this same institution receives a subsidy from the managers of the Louisiana Lottery Company, whose managers evidently believe that charity covers a multitude of sins; but we submit that their effort at "covering" looks as if they surmised that the robbing of Peter to settle with Paul was a profitable operation. The recent operation in Louisville (Ky.) gas circles is painted with a similar tinge, with the heirs and assigns of Chess, Carley & Co. as chief color-mixers.

NEW GAS COMPANY.—Messrs. G. K. McMurtrie, W. H. Searles, and E. M. Beasley, of Belvidere, N. J., and R. B. Williams and J. J. Clark, of Philadelphia, Pa, have filed articles incorporating the Belvidere (N. J.) Gas and Electric Company. The capitalization amount appears to be $10,000, par value of shares being $100. They expect to be ready for business by March 15, and to keep that promise will require the expenditure of a goodly share of energy. Belvidere is the capital of Warren county, N. J., is located on the Delaware river at the mouth of Pequest creek, is on a branch of the Pennsylvania Railroad, and is possibly 14 miles northeast of Easton, Pa. Deposits of iron ore, slate, and limestone abound, and the population of the place will not exceed 3,000.

A LINE OR TWO FROM NEBRASKA.—Superintendent Murphy, who manages manufacturing matters for the owners of the Nebraska City Gas Company, presides over a plant equal to a maximum send-out of 35,000 cu. ft. per diem. Pittsburgh coal is carbonized, and the average price received for gas is $2.50 per thousand. The companies at Plattsmouth and Beatrice supply water gas, the average rate of sale being $2.50 per thousand. Coal gas is sold at Lincoln and Hastings, the average rate being $2.75 and $2.70 per thousand. Omaha is in a constant ferment about the water gas sold there, and also as to the tariff charged for it. Fremont also deals in the CO agent. It is queer that coal gas is not universally manufactured in the State of Nebraska, for the residual market is a good one. For instance, at Nebraska City coke readily commands $6 per ton, and tar is worth $5 per barrel.

STREET LAMPS IN NEW BRUNSWICK, N. J.—The New Brunswick Gas Light Company supplies gas to 270 public lamps. These are lighted on an average of 19 nights each month, and for the service the Company receives $14.76 per post per annum. Out of that sum the Company must also recoup itself for lighting and extinguishing, glazing, painting, etc.

POOR GAS IN BROOKLYN, N. Y.—Consumers in the districts supplied by the Metropolitan, Peoples, Citizens, and Williamsburgh Companies have been loudly complaining at the poor quality of gas furnished them. The three first named buy "at wholesale" water gas from the Benedict-Jordan combination (otherwise denominated the Fulton-Municipal Company), and retail it in quantities to suit the demands of their consumers. The Williamsburgh Company manufactures coal gas—which fact seems rather queer when one remembers that its policy is dictated by those high in authority in the Standard Oil Company, whose naphtha headquarters, for this section of the country at least, stand on ground not 80 feet away from the retort house of the Williamsburgh gas works. The naphtha headquarters referred to are labeled "Pratt's Astral Oil Works." The Standard's peculiarity is to ever adapt itself to circumstances; hence the status of the Brooklyn gas situation. There may be a gas investigation in the City of Churches shortly.

THE WESTINGHOUSE EFFORT AT PITTSBURGH, PA.—We have advices that go to show that the Westinghouse Electric Lighting Company, of Pittsburgh, is taking some of Brother Denniston's consumers from the ledgers of the East End Gas Company. Westinghouse must of necessity make a fair showing at home in order that he may talk loudly when in "foreign parts;" and therefore some of his customers at Pittsburgh pay only 50 cents per month for a rated 16-candle power incandescent light.

CASTING OUT THE ELECTRIC LIGHT.—The Lincoln (Neb.) authorities have reason to regret that about a year ago they handed the public lighting of

the place over to the electricians, for they have put up with all its inadequacies—owing to a loosely worded contract—for the twelvemonth. On December 6, having seen the error of their way, the Council entered into an agreement with the Lincoln Gas Company, under the terms of which the latter will perform the public lighting for the next five years. Lamps and posts to the number of 150 are called for, and the maintenance sum agreed upon is $21 per post per annum. Mr. Homan J. Walsh is manager of the Lincoln Gas Company.

Fully Insured.—A telegram, bearing date December 13, states that the Cincinnati and Newport Iron and Pipe Company's foundry, at Newport, Ky., was damaged by fire on the morning of the 11th inst. to the amount of $25,000. A full line of insurance was carried, and, while temporary inconvenience may be felt, the proprietors will beyond doubt keep up with their contracts.

The Gas Undertakings of the United Kingdom.

The following, from the *Gas World*, will be of interest:

The annual Parliamentary returns relating to all authorized gas undertakings in the United Kingdom was issued to the public on Saturday last, just five months from the date when the House of Commons ordered them to be printed. The return relating to the undertakings of companies and that relating to undertakings owned by local authorities form separate papers, as usual, and are drawn upon the same plan as the returns for previous years. Although we discover that one gas company has no station meter, and that the station meter of another company is out of order—we hope it has been put right ere now—the returns are wonderfully complete. In two or three cases, however, we find the same figures as appeared in last year's returns, owing to the failure of the companies to supply later information. The defaulting companies are distinguished in the present returns by having their entries printed in italics, besides having a note explaining the recurrence of the figures of 1885. In addition to these, two local authorities have repeatedly failed to furnish any return whatever. With the exception of these few omissions the returns, as we have said, are fairly complete. But the irregularities of a few greatly militate against the usefulness of the figures for purposes of accurate comparison. The official totals given at the end of the returns must of necessity be erroneous, as no account is taken of any omissions in particular columns, nor of the repetition of the figures of last year. Another annoying defect of the returns, and one which cannot be easily remedied, is the irregular periods to which individual returns apply. The returns relating to gas companies are supposed to be applicable to the year 1885, and those relating to local authorities to the year ended 25th March, 1886; but we find on examination that the individual returns apply to periods ranging from May, 1884, to June, 1886. This irregularity, of course, renders the aggregate totals practically useless as a basis for comparisons extending over a number of years, unless an elaborate process of elimination, correction, and estimation be entered into. It is even doubtful whether such a process would produce, in point of accuracy, a result commensurate with the labor which it would entail. One peculiarly disturbing element in the returns is the presence of companies who supply both gas and water. In these cases the total capital employed is given, and no means are afforded for ascertaining, or even accurately estimating, the proportion of that capital properly attributable to the gas undertakings. We are therefore forced to the conclusion that while the returns contain much useful information, admirably arranged, concerning individual undertakings, they bear upon the surface little really trustworthy information as to the recent progress and present position of the gas industry in the United Kingdom. It is, perhaps, unkind to examine our gift horse too closely, but it is well to know his real value; for otherwise wholly erroneous impressions might be formed.

In our present review of the returns we will accept the official figures with all their faults, reserving for ourselves the right to treat them in any way we think fit on a future occasion. The return relating to companies shows that there are 374 of these authorized in the United Kingdom, and the return relating to local authorities shows a total of 162. The two together show an increase of 16 upon the number embraced in the returns of last year. The following tables will show more clearly than any words the business done by these 536 gas undertakings:

	Companies.	Local Authorities
Share and loan capital.....	£35,513,570	£19,619,416
Tons of coal carbonized.....	5,595,371	2,783,533
Cubic feet of gas made.....	56,903,060,785	27,734,666,850
" " sold.....	52,192,002,288	25,201,667,909

making the respective totals for companies and local authorities combined, £55,132,986; 8,378,904 tons; 84,637,727,635 cubic feet; and 77,393,670,197 cubic feet. Compared with the figures given in the returns issued last year the foregoing show increases of £1,449,077; 374,386 tons; 4,064,979,931 cu. ft.; and 3,675,774,683 cu. ft. respectively. Although these figures must be taken with the proverbial grain of salt, they give undoubted evidence of the vitality of the gas industry. The number of consumers and the number of public lamps supplied also show satisfactory increases, the former an increase of 36,669, and the latter one of 14,786. Of course, the companies and local authorities included in the returns for the first time will account for a proportion of the increase here shown, but these new undertakings being smaller fry will absorb but a small part of the total increase.

A closer examination into the aggregate figures would be useless and misleading, so we will leave them to take a rapid glance at the details. Perhaps the most notable feature of the return relating to the undertakings of local authorities is the proof that it affords that the Manchester Corporation is not the only authority which supplies gas to the street lamps free of charge. In this return no fewer than nineteen local authorities are specifically returned as supplying gas to the public lamps free of charge. England claims 17 of these, and Scotland and Ireland have one each. The column dealing with the disposal of profits is somewhat disappointing. "Applied in reduction of rates" is a reply which frequently occurs, but in a great many cases no information whatever is vouchsafed on the subject. Some authorities reply that it has not been decided what to do with the profits, others that they have been carried forward, and a very large number seem to have made no profit at all, at least no entry appears to indicate that such has been made. In the column relating to the price charged for gas—and this applies to both returns—we find some ten or a dozen undertakings where a special price is fixed for gas used in heating, cooking, or producing power. Perhaps the least complete column in the returns is that relating to the length of the mains employed. In a great many instances this cannot be given at all, and in many others the figure given is a mere estimate. In the instances where the figures are given it appears that the length of mains employed, ranges from 1½ miles to 1,786 miles, the gap between these two extremes being filled up by companies and authorities of almost all dimensions.

In this brief review we have not sought to enter into details, nor to make comparisons with the previous years for the reasons we have already given, and have only indicated the varied information that may be culled from these pages by the unwearied searcher after profitable, profitless, and curious statistics.

The Market for Gas Securities.

The city gas share market is without animation, for both buyers and sellers are apparently loth to come together in an adjustment of prices. As is usual during times of extreme dullness the bears assume command, but a profitless leadership they undoubtedly retain. Marking down quotations simply for the fun of the thing perhaps may afford amusement, for the method certainly does not mean money to the markers. On the regular exchange an occasional *bona fide* transaction in Consolidated transpires. For instance, this morning (Dec. 14th), one or two genuine small transfers took place at 79¼, but the sellers were those interested in other classes of shares held on margins, and the recent rapid slump, to use the Wall street vernacular, in listed fancies has been so swift that money must be raised to enable the holders to keep the margins good. Reduced to that predicament their Consolidated carryings must be thrown overboard in order that margins on Hocking Valley, East Tennesee, Nickel Plate, and various other wildcats can be kept intact. Equitable and Mutual gas have particularly attracted the notice of the bears; the former is now quoted at 109 to 113, as against 119-20 a month ago. Mutual is offered at 102 as against 105¾, at auction, a fortnight or so back. Both these classes are worth more money, and the bears, notably in Equitable, are likely to find so speedily.

The Brooklyn situation is worse than ever. Peoples is at 50; Metropolitan at 70; Nassau at 100, and so on through the list. Even Fulton-Municipal answers to the depression, being offered at 132—the lowest figure touched for a long while. In fact, a regular panic appears to rule in the Brooklyn list. Panic or not, Nassau looks tempting at par; but a *bona fide* sale of 100 shares, with an inquiry for a second hundred, would probably cause an advance of 12 points.

At auction recently: 86 Consolidated, city, at 79¾; 7 Yonkers, at 73, and 29 same Company at 78½ to 79. Auction, in Boston, Dec. 3, 18 Malden and Melrose, at 106¾; Dec. 11, 32 Brookline, at 110.

Baltimore (Md.) shares, are stronger; latest market returns from that point quote Baltimore Consolidated at 57, and Chesapeake at 70 to 72. Peoples, of Chicago, is quoted at 29 to 31, but the sale seems to be in line with a "bluff." We would not care to hold it at anything near those figures.

Death of Frederick Pitman.—Mr. Pitman, who had been examiner in shorthand for the English Society of Arts from the foundation of the examination in that subject in 1876 until the present time, died at his home at Crouch-end, England, on Sunday, Nov. 21st. He was elected a member of the Society in 1861.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 Wall St., New York City.

December 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	78	78¼
Central	440,000	50	—	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	109	113
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	113
Mutual	3,500,000	100	100	102
" Bonds	1,500,000	1000	104	106
Municipal, Bonds	750,000		—	—
Northern	125,000	50	36	—
" Scrip	108,000			
Yonkers		50	51	55
Richmond Co., S. I.	300,000	50	50	—
" Bonds	40,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	100	103
Citizens	1,200,000	20	65	67
" S. F. Bonds	320,000	1000	—	105
Fulton Municipal	3,000,000	100	129	132
" Bonds	300,000		—	105
Peoples	1,000,000	10	50	51
" Bonds	290,000	—	—	103
" "	250,000	—	—	102
Metropolitan	1,000,000	100	70	72
Nassau	1,000,000	25	100	—
" Ctfs	700,000	1000	—	101
Williamsburgh	1,000,000	50	116	119
" Bonds	1,000,000	—	—	111
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	130	138
" " Bonds	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	138	145
Peoples G. L. & C. Co., Chicago, Ills	3,000,000		29	31
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A Competent, Practical Gas Manager and Fitter.

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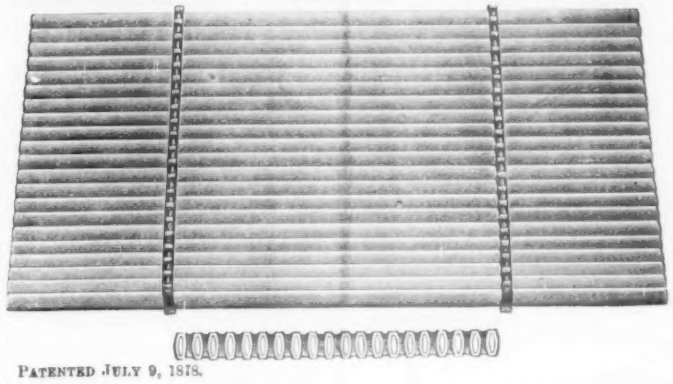

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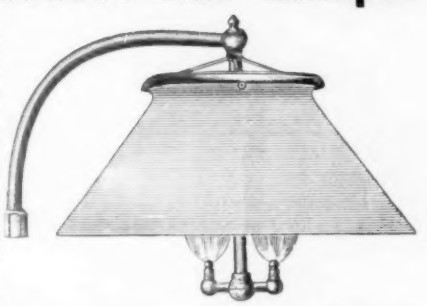

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The Latest and Most Improved Gas Light!

ADAPTED FOR PRIVATE RESIDENCES, CHURCHES, THEATERS, STORES, ETC.

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A new and superior preparation for enriching gas used in conjunction with Crystal Carbon or Albo-Carbon gas lights. The preparation is cleaner and better adapted for filling burner vessels than any hitherto produced. Guaranteed to be chemically pure. Supplied in cans from 10 pounds up.

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Illuminating Gas from Natural Gas,

AS MANUFACTURED UNDER THE

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TO ALL WHOM IT MAY CONCERN.

Notice is hereby given that a suit is now pending in the U. S. Circuit Court for the Northern District of Illinois against the Chicago Gas Apparatus Manufacturing Company and Newman A. Ransom, for infringing our rights under Letters Patent of the United States No. 247,925, dated October 4th, 1881, and No. 333,862, dated January 5th, 1886; and that a similar suit for like infringement has been instituted against W. S. Horry (trading as the Crystal Carbon Light Company), Arthur Kitson (trading as Kitson & Co.), and others, in the U. S. Circuit Court for the Eastern District of Pennsylvania. All persons in anywise infringing upon our rights under said Letters Patent will be prosecuted by us upon our obtaining proof of such infringement.

WALTER J. KIDD, General Manager

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South Bend Gas Light Co., South Bend, Indiana.— Daily capacity, 250,000 cu. ft.
Sheboygan National Gas Comp'y, Sheboygan, Wis.— Daily capacity, 120,000 cu. ft.
Salina Gas Light Company, Salina, Kansas.— Daily capacity, 120,000 cu. ft.
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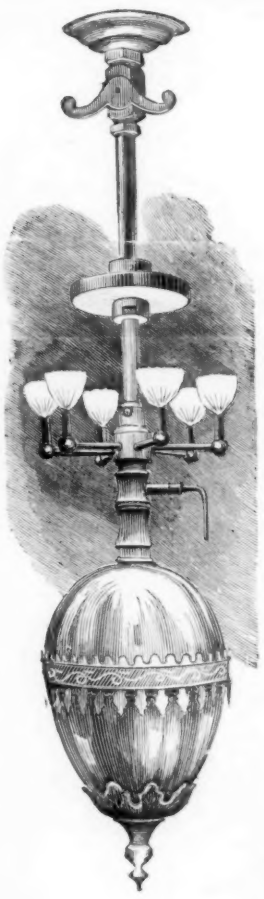
1886



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Gas Companies are Finding this System Superior to All Others

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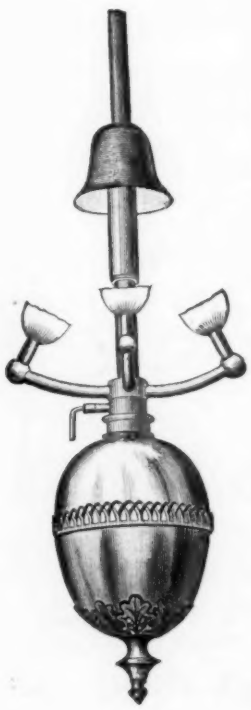

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NOTICE.

Suits are pending in the U. S. Circuit Courts in Illinois and Pennsylvania against various persons for infringement of our Letters Patent No. 247,925, dated Oct. 4, 1881, and No. 333,862, dated Jan. 5, 1886. All persons are cautioned against manufacturing, selling, or using any apparatus or material which infringes our Patents. We intend to commence suits against all parties infringing Patents owned by us.

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AUTOMATIC GOVERNOR FOR STREET MAINS.

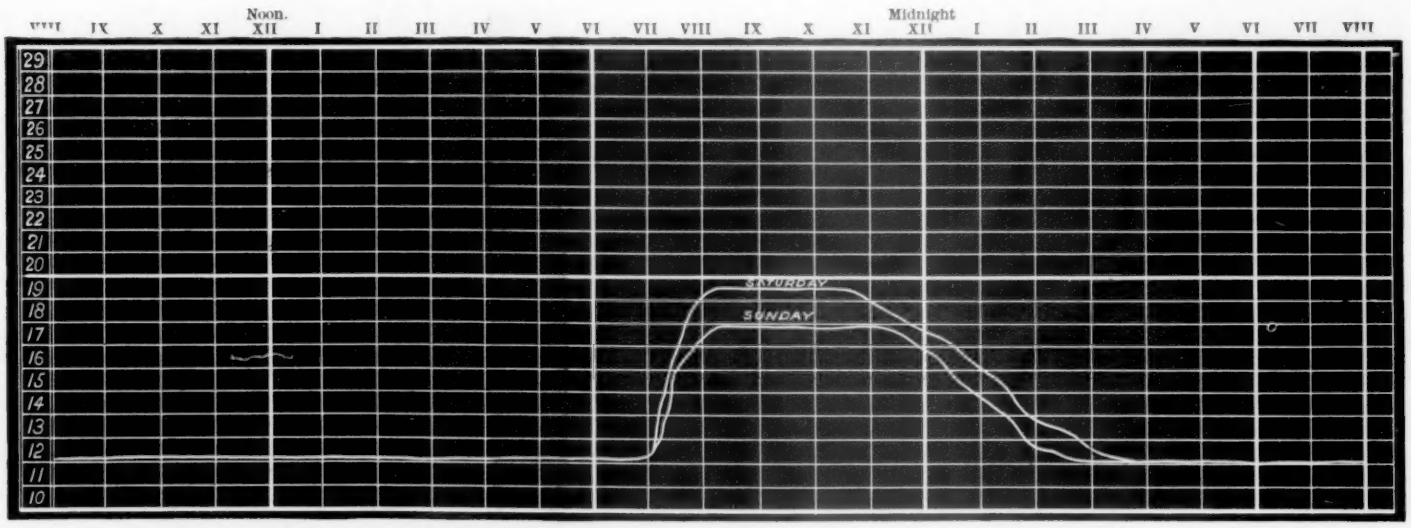
We invite the attention of all practical Gas Managers to the following letter and accompanying cut. The two lines show the pressure held by the Governor on Saturday and Sunday, and clearly illustrates the accuracy of the Governor in *increasing* and *reducing* pressure *in proportion to the volume of gas consumed.*

A Governor that puts the increased pressure on at "one fell swoop" and takes it off in like manner is *not* an "Automatic" Governor; and the circulation of pressure sheets showing such action by a so-called "Automatic" Governor is a rather amusing reflection on the intelligence of Gas Managers.

Strictly speaking, a "Balanced" Governor is an "Automatic" one, as it automatically varies the volume of gas sent out to *maintain a uniform pressure* at its outlet. But, as now applied, the term "Automatic Governor" is understood to mean a Governor that will *maintain pressure between any two desired extremes, in direct proportion to the volume of gas consumed.* Therefore pressure sheets showing *instantaneous changes* from maximum to minimum and *vice versa*, circulated broadcast as the record of an "Automatic (?) Governor," reveals inexcusable ignorance of the subject, amusing to many, yet liable to mislead the inexperienced novice.

We would suggest that all Gas Companies contemplating the placing of *Automatic* Governors would consult their own interests and avoid annoying experience by adopting a Governor *that has a record.*

CONNELLY & CO., LTD., 177 Broadway, N. Y.



Card Showing Pressure at the Milwaukee Gas Works, Saturday, July 10, and Sunday, July 11 1886.

MILWAUKEE, WIS., August 3d, 1886.

MESSRS. CONNELLY & CO., LTD., 177 Broadway, New York:

Gentlemen—Replying to yours of 29th, I send you a little package of register sheets. When your Governor (20-inch) was set I adjusted it to give 13-tenths day pressure and 22-tenths night pressure. Saturday nights it would run up to 25-tenths. Whenever it would cloud up in the daytime it would go up at first indication of darkness to about 15-tenths. I hunted back in the sheets to find one when pressure was increased in the daytime, but it is so long since we have had a stormy day I could not find one. You can, however, see a *slight change* on sheets for June 1 and June 25. You will see, too, that lately the Governor only puts on *about* 20-*tenths maximum pressure.* This is because *less gas is burned than when it was adjusted.* We have no complaints of pressure, and everyone appears satisfied. In conclusion, can say the Governor has *never been touched* since it was first adjusted, and has at all times *done just the work we wished it to do.* Very truly yours, E. G. COWDERY, Engr. & Supt.

T. C. HOPPER'S

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Is now in Practical Operation, doing Perfect Automatic Service with Great Precision.

This Governor will do all and more than any other Governor on the Market.

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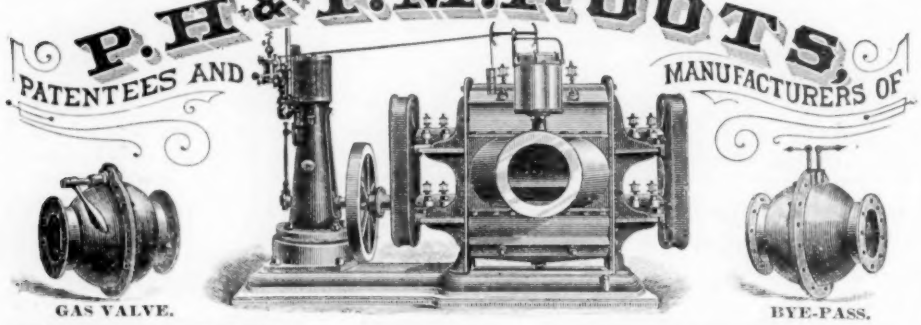

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IMPROVED GAS EXHAUSTER,

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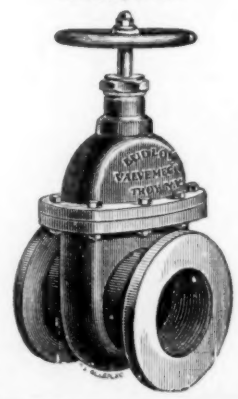

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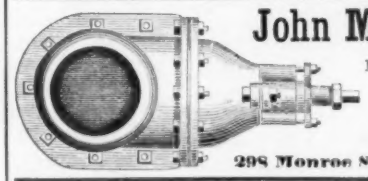

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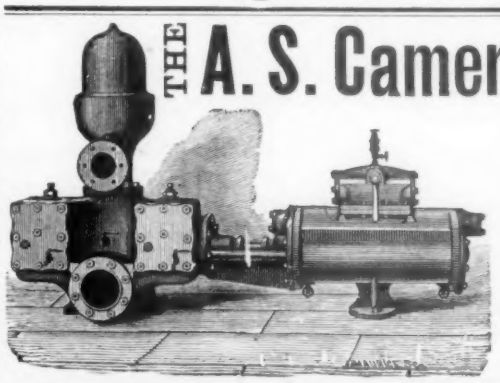

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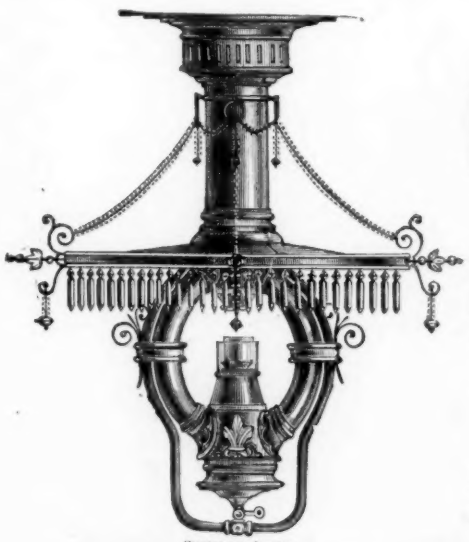

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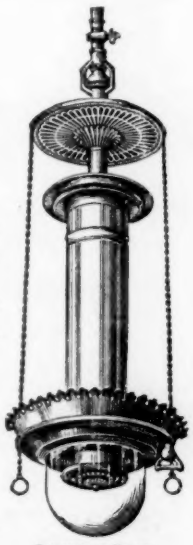

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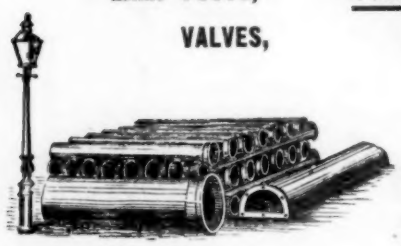

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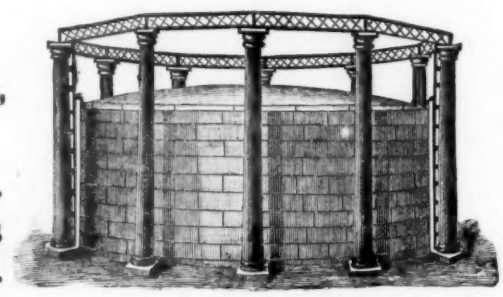

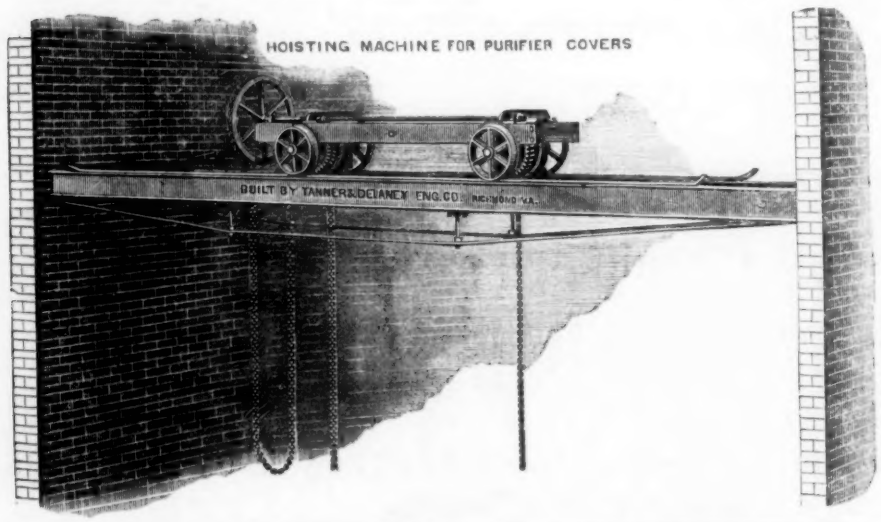

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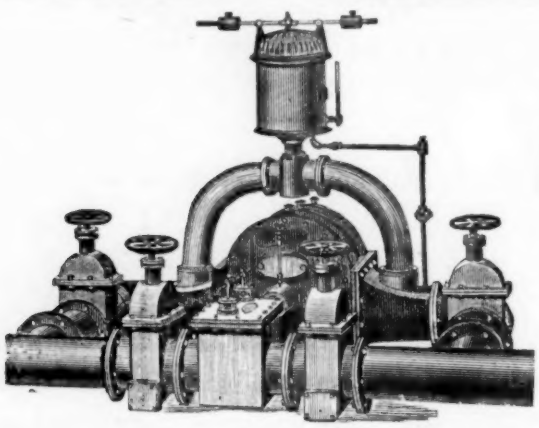

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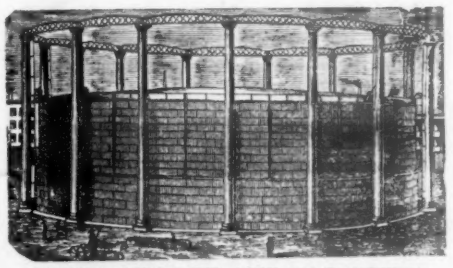

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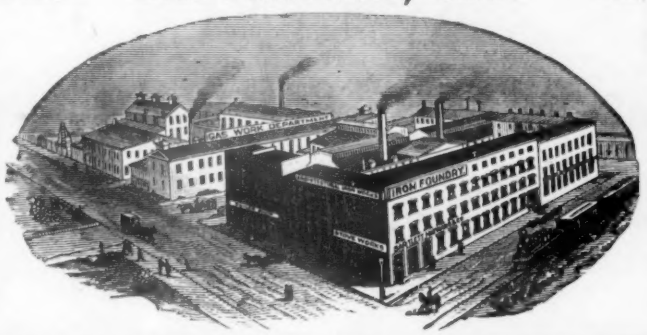

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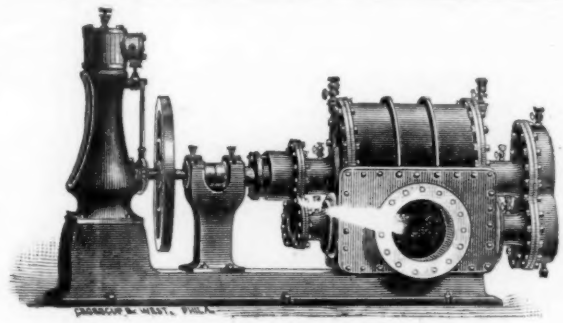

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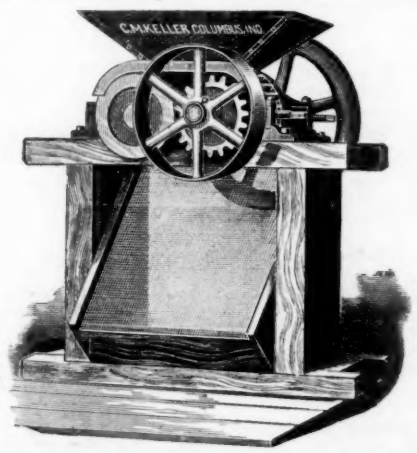

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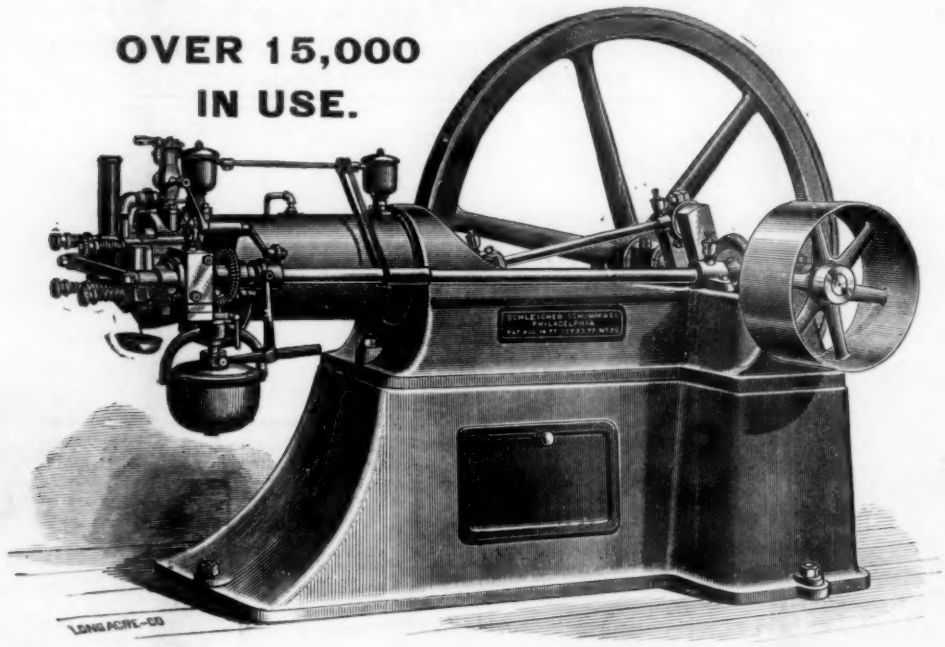

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